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OFFICIAL ORGAN of THE MASSACHUSETTS MEDICAL SOCIETY and of THE NEW ENGLAND SURGICAL SOCIETY

$5 per Annum, 15c per copy
Vol. CLXXXIII, No. 25

THURSDAY, DECEMBER 16, 1920

Published weekly in Boston, at 126 Massachusetts Avenue

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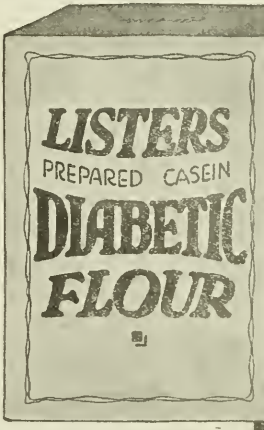

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MEDICINE.

THE EFFECT OF HIGH PROTEIN DIET IN NEPHRITIS.

WOODLEY, E. (*Quart. Jour. Med.*, October, 1920) made accurate gravimetric estimations of the amount of albumin in the urine in nephritics on low and high protein diets, and found that the amount of protein in the diet had no effect in the albuminuria. He noted a beneficial effect of a high protein diet, or large doses of urea, on the edema, if not accompanied by retention of nitrogen. He speaks warmly of the value of Maclean's urea concentration test, which consists in the estimation of the urea percentage of the urine before and after giving 15 gms. urea by mouth. The giving of so much nitrogen, however, (7.5 gms.) hardly seems advisable in cases showing any marked degree of nitrogen retention. [W. T.]

THE DIAGNOSIS OF DISEASES OF THE PANCREAS.

WALLIS, MACKENZIE (*Quart. Jour. Med.*, October, 1920) has made an exhaustive study of the various functional tests of the pancreas. Much interest attaches to his tests for diastase in the urine. This ferment has been found by various observers to be increased in diseases of the pancreas, both acute and chronic, but has not been studied hitherto on such a large material. Wallis found a marked increase in the urinary diastase in acute and chronic pancreatitis and in carcinoma of the head of the pancreas. It should be noted, however, that this increase is more apt to occur in the early stages of pancreatic disease, and may be lacking later. Apparently the diastatic content of the urine is not increased in diseases that do not involve the pancreas.

He attaches great importance to the combination of a positive Loewi test (dilatation of the pupil after instillation of adrenalin) with glycosuria, alimentary or spontaneous, and increased diastase. The Loewi test is often negative or transitory, however, and is met with in other conditions, so that it is of value only in connection with other signs of pancreatic disease. Indeed, Wallis points out that none of the functional tests can be depended upon alone, but the diagnosis depends upon a consideration of the whole picture. He found the Sahli capsule and the Sajodin tests unreliable, and the Schmidt meat-ball test inferior to a simple meat meal, with search of the stools for creatorrhea afterwards.

The trypsin test on the stools (casein method) he considers of little value. A considerable experience on the part of the reviewer has led him to a different view, the finding of very low values for trypsin, with proper technic, having been almost invariably associated with total obstruction of the pancreatic ducts. The finding of normal values, however, does not preclude advanced disease of the pancreas without obstruction.

Wallis does not even mention the examination of the duodenal contents as obtained by the duodenal catheter, although this method of studying the pancreatic ferments has won an established place in the diagnosis of pancreatic disease. The estimation

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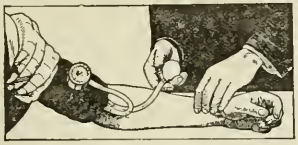

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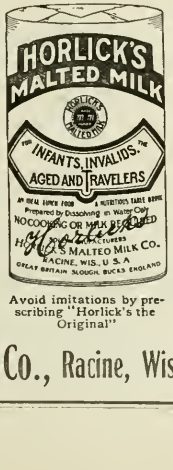

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of the diastatic content of the feces has proved to be of no value.

He attaches great importance to the presence of steatorrhea, and points out that the microscopic examination alone may not always reveal the presence of fat in excess. A chemical quantitative analysis then becomes necessary. The presence of more than 50% of total fat in the dried stool has proved diagnostic of pancreatic disease, for the exclusion of bile alone from the intestine does not lead to such a high percentage of fecal fat.

In diabetes mellitus the various functional tests all proved negative.

A number of illustrative histories are appended.

[W. T.]

The Diagnosis of Spinal Meningeal Tumor and its Practical Importance.

Williamson, R. T. (*Brit. Med. Jour.*, Aug. 21, 1920) discusses the diagnosis of tumors of the spinal cord and urges a more careful study of this subject as its early recognition will lead to early successful operation. He emphasizes the following points:

1. Persistent localized root symptoms (girdle pain or pain in one limb) *followed, after a considerable time*, by paraplegia (of gradual or rapid onset), should always lead to a very careful consideration of the probability of spinal meningeal tumor, especially if the cord symptoms increase in "cross section" intensity but do not ascend, or ascend only very slightly.

2. In certain rare cases, the root symptoms (pains) may be absent, but in such cases the motor and sensory cord symptoms steadily increase in "cross section" intensity, but do not extend upwards.

3. Persistent abdominal or thoracic pain, if bilateral or of a girdle character, even if signs of paresis of the legs cannot be detected, should lead to a careful examination of the chest or abdomen for zones of diminished sensation (tested by cotton-wool). If such should be detected, and if they correspond to definite root areas, meningeal tumor should be carefully considered. Also brachial "neuritis" of very long duration should lead to a careful consideration of the possibility of spinal meningeal tumor.

[J. B. H.]

Present Condition of Vitamines in Clinical Medicine.

Hopkins, Chick, Hess, Still, Williams, and others (*Brit. Med. Jour.*, July 31, 1920) discuss the general subject of vitamines as this question stands at the present time. The remarks here presented are difficult to review adequately, but bring the subject well up to date to those interested. [J. B. H.]

The Commoner Complications of Bacillary Dysentery in Military Practice.

Manson-Bahr (*Brit. Med. Jour.*, June 12, 1920) considers the complications of bacillary dysentery, with particular reference to various forms of arthritis. Parotitis and iridocyclitis were uncommon complications. He summarizes his observations as follows:

It is reasonable to suppose that there exists an idiopathic dysenteric arthritis due to the absorption of specific dysenteric toxins from the bowel wall and their excretion (as is known to be the case dur-

(Continued on page viii.)

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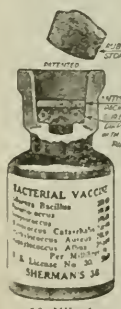

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(Continued from page vi.)

ing the absorption of toxins of septic and gonorrheal origin) into the joint cavities.

In the same manner, the arthritic symptoms occurring during the course of serum sickness may be justly regarded as representing an effort on the part of the organism to rid itself of toxins peculiar to horse serum; and it is possible that a particularly high percentage of these toxins, even when introduced in moderate doses into a subject already suffering from dysentery in which *per se* arthritis is not an infrequent complication, may not only determine the onset of the condition, but also the amount of disintegration of the joint thus produced. [J. B. H.]

STUDIES OF INFLUENZAL PNEUMONIA AND ITS TREATMENT.

PETRÉN (*Edin. Med. Jour.*, June, July, August, 1920), in a long and elaborate article, discusses the studies on influenzal pneumonia and its treatment. He believes that this condition is a distinct clinical entity. According to his views, the bronchitis and pneumonia of influenza are only different degrees of development of the same local morbid affection. He is of the opinion, therefore, "that influenza is a typical disease; that influenzal pneumonia is part of the disease process and finds its explanation in quantitative factors which determine the varying degree of development of the local morbid affection in the respiratory tract."

In treatment he is a believer in the use of digitalis and, curiously enough, has had good results with the use of nea-salvarsan. He has had some experience with what he calls re-convalescent serum and believes that it is of value. He gives an elaborate list of references. [J. B. H.]

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THE DIFFERENTIAL DIAGNOSIS OF TUBERCULOSIS.*

BY E. O. OTIS, M.D., BOSTON.

"WE are missing tuberculosis ten times more often," says Dr. Pottinger,[1] than we are diagnosing other diseases as tuberculosis," and with this statement I think we would all agree. I might even go farther and say that if one can make a fairly good diagnosis of pulmonary tuberculosis he will not often have occasion to reproach himself for having diagnosed a case of non-pulmonary tuberculosis for one of that disease. Still there are, in the experience of all of us, diseases and conditions occurring which closely simulate pulmonary tuberculosis but which have a different etiology —diseases which are caused by other microorganisms than that of the tubercle bacillus. This fact was strikingly illustrated in the recent war; for example, after a little more than a year of the war Professor Landouzy announced that already 86,000 men had been discharged from the French Army on account of tuberculosis, while later Major Rist declared that when the diagnosis was better made, there was only one-fifth of this number that were positively tuberculous.[2]

Elliott, speaking for Canada, says: "There is no doubt but that 60 to 80 per cent. of the cases returned from overseas as tuberculosis suspects must be classified as not suffering from tuberculosis." It must be borne in mind that the conditions of war compelled hurried examinations, and there was no opportunity for further observation, so that when there was doubt, tuberculosis was doubtless given the advantage of the doubt.

It is a serious matter, moreover, to pronounce a man tuberculous, for in the present state of public opinion, the disease is considered far more contagious than we, as physicians, know it is, and if a man is once diagnosed as tuberculous he is seriously handicapped in earning his living and indeed in his social relations, for with many laymen it is, "Once tuberculous, always tuberculous." While trying, therefore, to avoid the mistakes of a wrong diagnosis of tuberculosis when it does not exist, we must bear in mind that the tendency is in the other direction, that is, to fail to detect the presence and activity of the infection when it does exist. The sins of omission are far more than those of commission.

Unless one obtains fairly plain and clear evidence of active tuberculous disease he

* Read at the State Clinic for Physicians, Fairfield, Maine, August 3, 1920.

either has to consider other diseases of the lungs or of other organs, or keep his patient under observation until he obtains more evidence. To send a patient to a sanatorium or put him under treatment and disrupt the course of his life on a suspicion is hardly a sound medical procedure, and yet any sanatorium physician will tell us that this is repeatedly done. One may answer that the open-air treatment will do him good anyway, even if he has no active disease, but the stigma of tuberculosis is upon him and he is taking the place of someone who is really tuberculous and who, in consequence of waiting, may lose his best chance of an arrest. If in doubt, keep your patient under observation and treat his general condition according to the existing symptoms, but be very sure that the doubt is fully justified.

Before taking up the subject proper of differential diagnosis, and as preliminary to it, I should like to ask your forbearance for a moment while I briefly go over the essential facts which we must have in order to make a positive or practically positive diagnosis of pulmonary tuberculosis. In the first place, a positive sputum makes it, and we occasionally get a positive sputum when there are no definite physical signs. We are told, however, and rightly, that we must not wait for a positive sputum in making an early diagnosis. We are therefore to depend upon the symptoms and physical signs. Those of us who examined soldiers for tuberculosis in the late war were obliged to depend almost exclusively upon the physical signs, such was the rapidity with which the examinations had to be made. We were told that the only trustworthy sign of activity of apical tuberculosis was the presence of persistent moist râles, and when these were found it was a cause for rejection. In civil life, however, we have more time to go over our cases carefully, and a thorough examination requires very considerable time.

In the diagnosis of an early case we have, as we know, to depend largely upon symptoms, for physical signs may be and often are slight or indefinite. As Lawrason Brown says in his aphorisms, "Symptoms are a better and more accurate guide to activity than physical signs." We all know the telltale symptoms:—a slight but lingering cough; tachycardia; slight but persistent rise in temperature; loss of weight and strength; anaemia; slight dyspnoea on exertion; and not infrequently slight hemoptysis with many other suggestive symptoms. When all of these or the more characteristic ones are present we can with confidence make a fairly certain diagnosis of tuberculosis, for they indicate constitutional toxaemia. Any physician, I believe, if he will take the time and pains to carefully elicit and evaluate the symptoms, can generally make a fairly accurate diagnosis of early tuberculosis, whether or not he finds bacilli in the sputum, and whether or not he finds definite physical signs. The difficulty often is that the physician does not have the courage to base his diagnosis upon well marked symptoms alone, but wants it corroborated by definite physical signs or disregarding the study of the symptoms, bases his diagnosis upon the physical signs or lack of them, as we did in the Army.

As to physical signs, much can often be learned from inspection and palpation, and when it comes to percussion and auscultation the detection of râles after cough is and will always remain "the most important procedure in the detection of physical signs of early tuberculosis." Of course I do not mean to say that percussion differences and abnormal respiratory sounds are not also to be looked for and taken into account when we can be sure of them, but slight or doubtful variations in percussion and auscultation are often of uncertain determination and do not lead us to any certain conclusion. As the disease progresses, more definite physical signs appear and it is mainly in the more advanced stages of the disease that a resemblance to other non-tuberculous cases occurs, and here comes in our differential diagnosis. It is true, however, that not only the symptoms in these non-tuberculous cases also resemble those of early tuberculosis; but also similar physical signs, especially râles, may occasionally be found in the apex of one or both lungs.

In the majority of non-tuberculous diseases of the lungs, however, the physical signs are in the *middle* or *lower* lobes, and when found in these localities, with no discoverable disease in the apex, they almost invariably do *not* mean pulmonary tuberculosis.

Furthermore, when, on repeated examination at intervals, no tubercle bacilli are found, we can conclude with assurance that the disease is not tuberculosis, whatever the physical signs

may be. "In most of these cases which simulate pulmonary tuberculosis," as Ash says,[3] "we must bear in mind that we are dealing with types of cases that are confused with those in the advanced stages of tuberculosis, in which it is very unlikely to be overlooked, and that we are not considering the early stages of the disease in which the tendency is to err in the other direction."

Of the conditions and diseases which may be mistaken for pulmonary tuberculosis, and which more or less simulate them, we have the following:

Conditions and diseases which may be mistaken for pulmonary tuberculosis:

1. Diseases of the Upper Respiratory Tract.
2. Pulmonary Diseases.
3. Influenza, Collapse.
4. Bronchitis, Asthma.
5. Bronchiectasis.
6. Empyema, Abscess, Gangrene.
7. Cardiac Lesions.
8. Diseases of the Pleura.
9. Cancer of the Lungs.
10. Actinomycosis.
11. Aortic Aneurysm.
12. Syphilis of the Lungs.
13. Anaemia, Neurasthenia, Dyspepsia, Anorexia.
14. Hyperthyroidism.

1. *Diseases of the Upper Respiratory Tract.* In a suspected case of early tuberculosis always examine the upper respiratory passages. Fisherg declares that in his experience "the most common pathological conditions mistaken for tuberculosis are diseases of the upper respiratory tract."[4] We may find the cause of the symptoms in a chronic pharyngitis, adenoids, enlarged or diseased tonsils, or in some of the nasal sinuses. Patients suffering from such conditions often have a chronic cough with mucoid or mucopurulent expectoration which at times may be blood streaked. I have had such cases come to me in great alarm because they have seen a little blood in the sputum. If an acute condition intervenes, such as coryza or tracheo-bronchitis, we may have a rise of temperature, loss of weight and strength, etc. There are no really definite physical signs, although we may think we find some slight impairment of resonance and modification of respiration in an apex, especially in the right apex, where physiologically these differences occur. The differentiation of these upper respiratory conditions from tuberculosis depends upon the facts that there are no toxic constitutional symptoms such as fever, tachycardia, loss of weight, strength, etc., and a negative sputum. The cough, moreover, is different in the nasopharyngeal diseases. It is likely to be more pronounced and may have lasted for years. Another characteristic is the raising of a little sputum often inspissated in the morning. "No patient," says Fishberg,[5] "should be pronounced sick with phthisis unless there are found distinct signs of an apical lesion with positive sputum, when the pulse and temperature are normal, when he states he has been 'subject to colds' for many years and shows pathological changes in the nose and throat."

Elliott[6] speaks of a group of cases in which the cough, sputum, and pulmonary signs are secondary to a focus about the teeth and which clear up under appropriate dental treatment.

2. *Pulmonary Diseases.* Of the two acute infections of the lungs, bronchopneumonia, and lobar pneumonia, either may give the classical picture of the simple disease, while both may be the beginning of an acute tuberculosis. Time alone can differentiate. If resolution does not take place and the acute symptoms continue indefinitely we shall sooner or later obtain evidence of destructive processes and tubercle bacilli in the sputum. We may have delayed resolution with some of the symptoms and physical signs which would suggest tuberculosis, and in a more or less advanced stage. Here again, however, the physical signs are in the base and there are no tubercle bacilli in the sputum.

Another type of pulmonary disease which may be mistaken for tuberculosis is what has been called a sub-acute or avirulent lobar pneumonia beginning with what is described by the patient as a "cold settling upon the lungs." After a few days of acute symptoms the patient recovers but the physical signs in one or the other lower lobes may persist for a considerable time together with the cough and sputum. The physical signs, however, are at the base and the sputum is negative.

3. *Influenza—Collapse Induration of Apex,* (Fishberg's nomenclature) *resulting from nasal obstruction, adenoids or enlarged tonsils.* To influenza, on the one hand, is often attributed the beginning of an active tuberculosis, where-

as in reality it was not influenza at all but an acute outbreak of a latent tuberculous process. On the other hand we may have an apical localized bronchitis, which Fishberg calls "apical catarrh," as the result of a genuine influenza attack. In both conditions we have cough with expectoration, debility, anaemia, loss of weight, etc., and the physical signs may be similar, if the influenza process is located at an apex. There are râles, impaired resonance, and there may be (in influenza) changes in the voice and breath sounds.

The sputum, however, is purulent and constantly free from tubercle bacilli in the true influenza cases, and the constitutional symptoms are not as marked or progressive as in tuberculosis. The tachycardia and fever are also absent. Recovery, moreover, takes place in a comparatively short time. These cases of influenzal catarrh are often very puzzling and only time and prolonged observation will lead one to a positive diagnosis in some of them.

In cases of so-called *collapse induration* from the causes enumerated above, namely: occluded nasal passages and enlarged tonsils, we may have physical signs in the apex of the lung much like those of a tuberculous lesion, and a persistent cough. There are no constitutional symptoms, however; the sputum is negative; the patient is well nourished; and the general appearance is not that of a tuberculous individual. This leads me again to repeat that in the examination of suspected cases a careful exploration of the upper respiratory tract should always be made. If the diagnosis of tuberculosis is made, it is of the highest importance, in successful treatment, that the upper respiratory tract should be fully patent, permitting free respiration.

4. *Bronchitis—Asthma.* Many a case of early tuberculosis has lost its best chance of recovery by being called "only bronchial," because the diagnosis was made upon a persistent cough without duly considering all the symptoms.

In bronchitis, of course, the physical signs are usually bilateral, although I have more than once found localized râles at one or the other base, which I regarded as a localized bronchitis and which have been taken to be tuberculosis. In bronchitis, especially chronic bronchitis, there is no impairment of resonance. The respiration is fairly full, although it may be harsh; and the râles, especially the moist ones, are generally confined to the base. The general condition of the patient is good, and the sputum is tubercle bacilli free.

Many chronic bronchities have coughed and expectorated for years, and still remain in good health, without any of the usual constitutional symptoms of tuberculosis. One must bear in mind, however, that a definite tuberculous lesion may exist in conjunction with a chronic bronchitis. Not infrequently a case of early tuberculosis may refer the beginning of his trouble to a *cold*, whereas it was not a cold but a symptom of the activity of his tuberculosis.

Asthma. The association of asthma and tuberculosis is rare. I do not recall but one case. One can hardly fail to make a diagnosis of the former, though a tuberculous fibroid condition may give attacks of dyspnoea which may be mistaken for asthma. In such cases the differential diagnosis is usually not difficult. The history is different. In the tuberculous cases the asthmatic symptoms are not typical. There is debility and emaciation. The sputum may be positive and we will probably detect localized signs at the apices. It should not be forgotten, however, that the two diseases may be associated.

5. *Bronchiectasis.* In my experience bronchiectasis is far more common than is supposed or diagnosed. And it may be, and is not infrequently, mistaken for tuberculosis, and in consequence the sufferer may be treated even for years as a case of advanced tuberculosis. Bronchiectasis may involve a good part of the lung; there may be one or more discoverable cavities, and we may have a cavity in the apex, as I have seen. The physical signs are those of an advanced tuberculosis, and there is often hemoptysis. What differentiates bronchiectasis from tuberculosis is that there is never any tubercle bacilli in the sputum. The disease is of long duration, often with no very great deterioration of the general health. The cough is paroxysmal, with a large amount of sputum which may be fetid. The pulse is normal and so is the temperature, in the majority of cases. In brief, the bronchiectatic patient does not present the general appearance of a far advanced case of tuberculosis, with extensive lung involvement, such as may be found in bronchiectasis. He looks and says he feels in good condition. If one depended upon the physical signs alone, he would in many cases be justi-

fied in making a diagnosis of advanced tuberculosis, but the negative sputum, the history, the well-being of the patient, and the character of the cough and sputum should set him right.

Another sign of bronchiectasis, more frequently found in this condition than in tuberculosis, in my experience, is clubbed fingers.

6. *Empyema, Abscess, Gangrene.* These conditions sometimes, in their symptoms and physical signs, suggest an advanced tuberculous process, but the differential diagnosis is not difficult. In the first place the sputum is negative and the physical signs are in the middle or lower lobe. We have also the history of a previous pneumonia or a pleuritic effusion, or some acute septic process, perhaps following an operation for appendicitis, or, with abscess, following an operation of tonsillectomy with general anaesthesia, or after childbirth. We have symptoms of cough, expectoration of large quantities of purulent matter, if the pus communicates with a bronchus; sometimes hemoptysis, intermittent fever, loss of weight, etc. The physical signs are in the middle lobe or base, as I have said, and generally give evidence of fluid, such as marked dullness, distant respiration, which may also be cavernous if the cavity is empty. In doubt an exploratory puncture may clear up the diagnosis. A blood count is also helpful, for with pus we shall get a leucocytosis.

In gangrene we have the fetid sputum which never occurs in tuberculosis, and there is generally some discoverable primary cause such as a previous operation or sepsis somewhere, or an embolus.

7. *Cardiac Lesions, giving symptoms simulating tuberculosis.* The dominating symptom in cardiac disease which suggests tuberculosis is hemoptysis, caused generally from mitral stenosis. Other suggestive symptoms are cough, emaciation, dyspnoea on exertion. On physical examination we may have evidence of oedema (râles) in the bases, or we may have apical râles. In the course of cardiac disease we may have, as we know, an infarction in which, after the acute symptoms have subsided, the physical examination may show in a localized area, with signs of consolidation, dullness, modified respiration and moist râles, occurring generally in one of the lower lobes. The evidence of cardiac disease, however, and the history will, in the majority of cases, make the diagnosis clear. In all cases of examination of the lungs, as in hemoptysis, an examination of the heart should also be made.

8. *Diseases of the Pleura.* A large majority of pleurisies with effusion, we believe, are caused by the tubercle bacillus from a pre-existing focus in the mediastinal or tracheal bronchial glands or elsewhere. Nevertheless, many of these cases of pleural tuberculosis do not subsequently develop pulmonary tuberculosis. One must be cautious, therefore, in concluding that active lung tuberculosis is present.

There are certain signs in the course of a pleuritic effusion which suggest involvement of the lungs. In the acute stage we may have râles at the apex of the affected side, perhaps due to the adhesion of the lung at the apex. Later in the period of convalescence the lung may expand imperfectly and some fluid may remain, so that we have dullness and limitation of movement due to pleural adhesion, partial collapse, a thickened pleura or fluid.

Furthermore, debility persists, and the question of tuberculosis arises, which only time may solve. The sputum, if there is any, must be repeatedly examined, and the apex of the lung carefully watched and any tendency of the basic signs to extend towards the apex or the development of fresh signs at one or both apices strongly confirm the suspicion of tuberculosis. A serous fluid throws no light on the differential diagnosis; a bloody fluid suggests either tuberculosis or cancer, and a purulent fluid is usually non-tuberculous, although I have seen at least one exception. When a definite diagnosis is impossible, the treatment of the case simply as one of chronic pleurisy will be safe, for it is essentially the same treatment as that for tuberculosis.

In not a few cases of active tuberculosis pleuritic effusion occurs, and one may for the first time see the patient in which this has happened and his attention may be directed solely to the pleuritic condition to the neglect of a careful examination of the apex. Of course in every case of pleuritic effusion the lungs in their entirety should be carefully explored. It has happened in my experience that a tuberculous lesion has been discovered in one apex while the pleuritic effusion was in the other half of the chest.

9. *Cancer of the Lungs.* Malignant disease of the lungs is not so rare in my experience as some authors consider it. For example, within about a year I have met with three cases.

Neither does it always appear to be secondary so far as one can determine. In many of the symptoms and physical signs there is a close resemblance to tuberculosis. In both conditions we may have cough, hemoptysis, pyrexia, and dyspnoea, and as time goes on, loss of weight. There may or may not be pain. The cachexia, however, differs from that of tuberculosis. The physical signs may likewise resemble those of tuberculosis. In the early stages of the disease we may have only slight dullness with diminished respiration and perhaps râles. As time goes on, the dullness becomes more marked even to flatness, and the breath sounds become more feeble or are completely absent. Pressure symptoms also show themselves, such as prominence of the veins of the chest, oedema of the arms or face, and there is dyspnoea. The lymphatic glands may also be involved.

We may also have pleuritic effusion either serous, serosanguineous or purulent. The sputum examination is always negative to tubercle bacilli.

In differentiating malignant disease from tuberculosis we have the age,—as cancer of the lungs rarely appears before 40 years,—the lack of toxic symptoms and tachycardia, the situation of the physical signs below the apex in the middle or lower lobes, absence of tubercle bacilli, and as time goes on, the extreme dullness and feeble or absent breath sounds generally without râles. The general picture of a case of carcinoma of the lungs is in its unfolding quite different from that of a case of advanced tuberculosis. In these cases the x-ray is also of service.

10. *Actinomycosis.* Actinomycosis of the lungs is rare,—I have seen it but once—and it may be mistaken for tuberculosis. In the early stages we have cough, loss of flesh, fever, etc., and in the more advanced stages, fever, tachycardia, emaciation, cough, expectoration, hemoptysis, etc.,—resembling very closely progressive tuberculosis. When the pleura is reached we have an effusion which may be purulent or muco-purulent. The location is generally in the middle or lower lobe. There may be intermissions of the acute symptoms when the patient will feel pretty well. As time goes on, we obtain lesions of other organs, abscesses, and an external swelling on the chest wall or jaw, or elsewhere, and the excessive pain. The diagnosis is of course made by demonstrating the fungus from some of the discharges. The history also in the earlier stages may aid, and if the patient has had to do with cereals, our suspicion is aroused. When pleural effusion occurs, one may have recourse to aspiration and the examination of the fluid may disclose the fungus. It is said that occasionally the upper lobe is first affected and in this case a differential diagnosis from tuberculosis is very difficult. The disease, fortunately, is very rare and in only a very small portion of the cases are the lungs primarily affected.

11. *Aortic Aneurysm.* Although this condition would appear to have such a different symptom complex from that of advanced tuberculosis as not to be confounded with it, yet it has been mistaken for that disease and the patients sent to a tuberculosis hospital. Ash, in 198 autopsies at the Boston Consumptives' Hospital, and in 353 collected from other hospitals, found seven cases of aneurysm sent in for advanced tuberculosis, and McCrae and Funk[7] of the Jefferson Hospital, Philadelphia, in a series of 1200 consecutive cases coming with a diagnosis of advanced pulmonary tuberculosis, found two cases.

The symptoms, I suppose, which suggested tuberculosis were cough, dyspnoea, hemoptysis, and dullness upon percussion. The history, symptoms and a careful physical examination would, it would seem, make clear the distinction in the vast majority of cases.

12. *Syphilis of the Lungs.* This disease is very rare and I have never, to my knowledge, seen a case. Ash, however, reports four cases from his series, and McCrae and Funk four also. The symptoms are almost exactly those of an advanced case of chronic pulmonary tuberculosis, such as cough, expectoration, loss in weight, and sometimes hemoptysis. There is lung infiltration but it is localized in the lower or middle lobe. The disease is of slow progress and does not produce such serious constitutional disturbance as would tuberculosis with the same amount of infiltration. These facts, with the history, absence of tubercle bacilli from the sputum, syphilitic lesions elsewhere, and the result of treatment aid in the differential diagnosis. The Wassermann test may also help but it is sometimes positive in tuberculosis and moreover tuberculous patients may have had syphilis. It is to be remembered that many tuberculous patients also suffer

from syphilis and many syphilitic patients contract tuberculosis.

13. *Anæmia, Neurasthenia, Dyspepsia, Anorexia.* All of the above conditions may be considered the fundamental cause of the disturbance whereas they may be and not infrequently are symptoms of an incipient tuberculosis, and consequently all such cases should receive a very careful examination. Many unfortunate mistakes would be avoided if this was always done. We generally have more or less emaciation, cough, lassitude, and may have occasionally a little blood. The catamenia may also be absent or scanty. In one type of cases we have anaemia and dyspepsia, and in another, nervous phenomena, as the prominent symptoms. The temperature, however, is normal; there are no physical signs, and the cough is more pronounced and incessant. If there is sputum it is negative. Such cases must often be considered as suspects and kept under observation, and the temperature should be taken for a week. They should not, however, be sent to a sanatorium on suspicion solely, but their life regulated, and, as I have said, examined from time to time. When, on the other hand, we have these conditions—anaemia, dyspepsia, anorexia. neurasthenia—and in addition a rapid pulse, an afternoon temperature, and other evidence of toxaemia, even if we detect no definite physical signs, the only safe way is to put the patient under the regular tuberculosis treatment.

14. *Hyperthyroidism.* Hyperthyroidism not infrequent in young persons may, in its earlier or milder stages, simulate very closely in its symptoms a case of early tuberculosis and be mistaken for it. We have tachycardia, frequent sweating, lassitude, and perhaps cough and evening temperature, all of which are found in incipient tuberculosis, and hence the differential diagnosis may be difficult. There is, however, no evidence of a pulmonary lesion and no tubercle bacilli in the sputum, and, on the contrary, we may obtain the characteristic tremor and other vasomotor disturbance, together with the persistent tachycardia, which may lead us to the true diagnosis. If in doubt the patient must be kept under observation and repeated examination of the sputum made.

In order to view the question of the differential diagnosis of tuberculosis from another angle I have enumerated below the various causes of blood spitting, for this symptom always suggests tuberculosis.

Blood Spitting may be caused by:

1. Pulmonary tuberculosis.
2. May come from upper respiratory tract, epistaxis, gums, varices.
3. Gastric ulcer.
4. Cardiac; mitral stenosis.
5. Infarcts from emboli.
6. Aneurysm of aorta.
7. Bronchiectasis.
8. Abscess or gangrene of lungs.
9. Influenza.
10. Asthma, emphysema, bronchitis.
11. From oesophagus, cirrhosis of liver.
12. Acute specific fevers.
13. Cancer.
14. Arthritis.
15. From unknown cause.

Hemoptysis may be a symptom of every disease of the upper and lower respiratory tract. There are certain sounds sometimes heard on auscultation which more or less resemble râles and which may and have misled the examiner, but which arise from other causes and are not due to any pulmonary disease. Such are:

1. So-called "marginal sounds," closely simulating fine râles and heard in the lower axilla, especially the right, and only on inspiration. They are caused by the separation of the pleural surfaces as the edge of the lungs penetrates into the complemental space.

2. Muscle and joint sound, heard over the sternum, in the vicinity of the sterno-costal articulation; also along the clavicle and in many cases over the apices, the sounds being transmitted from the shoulder-joint and the sterno-clavicular joints.

3. Atelectatic râles, heard at the first deep breath or cough and not repeated, generally considered to be caused by the forced opening of atelectatic alveoli.

4. Slight dullness or rise of pitch at the right apex, with harsh or bronchovesicular respiration, heard especially above the clavicle anteriorly and to the third dorsal vertebra posteriorly with increased voice sound, are physiological and not pathological for the right apex.

In conclusion a few aphorisms:

1. Tuberculosis is much oftener missed than is non-tuberculosis diagnosed as tuberculosis.

2. Most non-tuberculous diseases of the lungs occur in the middle or lower lobes.

3. When the apex is clear only positive sputum should justify a diagnosis of tuberculosis.

4. Most non-tuberculous diseases of the lungs are comparable only with advanced tuberculous disease.

5. When tubercle bacilli are absent after repeated examinations the disease must be referred to some other cause than tuberculosis, even if the symptoms and physical signs are those of an advanced tuberculosis.

6. Do not condemn a patient as tuberculous upon a suspicion.

7. Spitting of blood may come from many causes, and alone does not justify a diagnosis of active tuberculosis.

8. The differential diagnosis of tuberculosis is sometimes difficult or impossible at the first examination, and only time and observation can finally solve the problem.

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Original Articles.

X-RAY DIAGNOSIS IN PHTHISIS.*

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IN reading medical literature one is impressed with an evident disagreement between certain clinicians and roentgenologists as to the value of roentgen diagnosis in diseases of the thorax, particularly that of pulmonary tuberculosis.

The clinician declares that the roentgenologist cannot make a positive diagnosis of early pulmonary tuberculosis by x-ray examination and the latter avers the contrary, there being some truth in the opinion of each but many times neither one has been willing to look at the matter relatively.

* Read before the Boston School Physicians' Association April 26, 1920.

The clinician has too often looked on the roentgenologist as an interloper in the field of medicine while on the other hand the roentgenologist has as often assumed the air of a sciolist, quite unwarranted by his finite knowledge.

Admitting the relative value of all methods of medical diagnosis as well as of knowledge in general, nevertheless the x-ray diagnosis of pulmonary disease has an absolute value which should be recognized by clinicians because of its direct relation to the human economy.

As has been stated many times and like all truisms it needs restatement, knowledge and experience are prime requisites in medical diagnosis. This is the only dogma, I would tolerate in medicine. Both the clinician and the roentgenologist must have knowledge and experience. It is quite as wrong for one as for the other to neglect any aid of proven worth that helps in arriving at a diagnosis. This does not mean at all that every laboratory or clinical method has the same relative value. Indeed no one specialized field of medicine contains all truth.

And it is particularly important that the roentgenologist be well trained in his own special field as well as having had a broad training in general medicine, otherwise his perspective is sure to be faulty and narrow. On the other hand, I do not approve of a certain ultra-conservatism among clinicians that questions data that rest on conclusions which can be satisfactorily demonstrated.

Pancoast has truly said that a well trained roentgenologist can be of great help to a mediocre clinician but that a mediocre roentgenologist is of no value to anyone.

Roentgenologists worthy the name accept the fundamental principles that x-ray examination is only a means to an end, although by itself it may establish a diagnosis; that x-ray examination is not meant to supplant other tried clinical methods but to complement them, yet it may be the most valuable of any of the known methods in arriving at the desired goal. Hence, it is a necessary means and should be universally employed.

It is within the memory of us all that when Cushing first demonstrated a blood pressure apparatus in this country and very city, after he had seen it in use at Rivva Rocci's clinic, the committee appointed to investigate its merits reported adversely and among other things stated that the blood pressure could be ob-

tained quite as well by the palpating fingers. This appears ridiculous to us now, yet the introduction of the clinical thermometer and stethoscope was subject to equally inexact criticism. So with x-ray examination of the chest. The point I would like to make is that the stethoscope, thermometer and sphygomanometer are helpful in only about 20% of the cases yet are employed almost universally.

Our present day surgical success owes much to team work. That is what we need in the present instance. Let us view the question with an open mind. Any valuable agency may be belittled if that is one's habit of mind. To destroy confidence in a diagnostic measure of very great value is the wrong way to penalize the "hyperenthusiastic roentgenologist."

In the examination of the chest there are two roentgen methods commonly used, *viz.*, the the screen or some especially coated photographic plate, film, or paper. The screen method, variously termed fluoroscopy or roentgenoscopy is of decided though limited value. In this method the skiagraph or shadow of the varying densities of the bodily tissues is registered and visualized upon a fluorescent screen.

This method is desirable for rapid orientation. By it one may at a glance perceive the gross topography of the lungs and may with safety make a positive or differential diagnosis of many pathological intrathoracic conditions. It is dramatic in its possibilities. When examining by the screen one may not only demonstrate fluid and its changing level but even the ripple of waves produced by coughing in hydropneumothorax and the like. One may, too, of course, see for one's self the actual freedom or limitation of the diaphragmatic excursion.

In general we favor the plate or photographic method because it gives us a permanent record for historical data and comparison besides giving us much detail that is lost in screen examination. Because of this very wealth of detail Miner of Ashevill, objects to the plate believing that it makes for confusion. No doubt, in his experienced hands screen examination is adequate, though it should not be advised routinely as the sole method. Personally we believe that if one is limited in methods then plates are to be preferred, yet we strongly feel that both screen and plate examination should be made of every patient.

Stereoscopic plates front and back may be of inestimable value. These are made, as many of you are aware, by making two separate x-ray exposures of the desired part, the first exposure to the right and the second to the left, equidistant of center, the tube shift to measure at least the interpupillary distance. The negatives are then inspected in a specially constructed view box. Simply expressed, stereoscopy gives one another dimension in estimating the value of densities. The type of tube and apparatus is immaterial provided it is adequate. Diemer and Cramer state that roentgenography of the chest cannot be satisfactorily done employing a Coolidge tube. In fact, a Coolidge tube can be used for this type of work just as well as for any other provided one uses a proper technic.

Our routine at the Boston Consumptives' Hospital calls for a careful physical examination, the results of which are charted out and forwarded to the roentgen laboratory. The patient is then examined by the fluorescent screen and the findings dictated *in cursu*. Stereoscopic or flat plates are then made accordingly as the screen examination would indicate and interpretation of the same dictated. The physical findings are then compared with the x-ray interpretation and discussed by the resident physician and house staff for final diagnosis.

Our experience compels us to the conclusion that except in particular cases one should use all data, both clinical and roentgenological, that are available.

For the correct interpretation of the fluoroscopic image or roentgenogram, definite knowledge of the distribution of the bronchi, the arteries, the veins, the lymphoid tissue, the lymph follicles and lymph nodes within the normal lung and at the hilum is absolutely necessary, for it is impossible to understand the pathological without a previous knowledge of the normal.

Anatomy Roentgenology has stimulated the anatomical study of the lungs, the results of which study have a very definite relationship to our objective findings.

Miller has demonstrated that the so-called lung lobule of the French school is in reality made up of from 50 to 200 primary lobules.

This primary lobule he calls the anatomical unit of the lung and defines it as that area within the lung which consists of an alveolar duct, the air spaces connected with it, their blood vessels, lymphatics and nerves. The alveolar duct being the last division of the bron-

chial tree before it breaks up into the parenchyma of the lung.

This lung tissue when involved by certain pathological processes, as tuberculosis, appears on x-ray plates as areas of increased density more or less triangular in outline, the so-called fans described by Dunram. These triangles can be made out where the disease has not progressed too far, not only at the periphery of the lung but also in the deeper portion of the lung. The size of the triangle depends on whether one or more primary lobules are involved.

The type of tuberculosis also influences the character of the density. In advanced stages the picture is one of diffused density and often a lung will show the irregularly shaped fans in one portion and the more advanced diffused density in another portion.

The bronchial (nutrient) artery is distributed to the walls of the bronchi, the connective and the lymphoid tissue of the lung. It also supplies the lymph glands of the hilum and in those lungs which possess a thick pleura as in man it extends to the pleura and there furnishes a special blood supply to the walls of the lymphatics.

The pulmonary (functional) artery follows in all of its subdivisions the subdivision of the bronchial tree. As it arches over the main stem bronchus it comes to lie posterior (dorsal) and slightly lateral to the bronchus. Owing to this position the lateral wall of the bronchus not infrequently shows an increase of density over the mesial wall on roentgen plates.

The relation of the main venous trunk to the bronchus is different from that of the arterial trunk; it is situated anterior (ventral) and mesial to the main stem bronchus. Its course differs in each lung, being more oblique in the right lung than in the left lung.

Contrary to the pulmonary artery and its subdivisions, the subdivisions of the pulmonary veins are always situated as far from the bronchi as possible.

When one knows the relationship of artery veins and lymphatics to bronchus the reason for their visualization upon the roentgen plate is evident. Miller says the larger branches of the pulmonary artery are accompanied by two or three main lymphatics, which are so arranged that one of them lies between the artery and the bronchus. These main trunks are connected by numerous loops and there is thus formed a network with a long mesh.

The smaller divisions of the artery are as a rule, accompanied only by a single lymphatic. The bronchial lymphatics and the arterial lymphatics are in communication with each other at the place where the bronchi divide and at the distal end of the ductuli alveolares.

The lymphatics form within the walls of the bronchi a rich network which extends throughout the entire bronchial tree. This network communicates freely with the network of lymphatics which accompany the pulmonary artery, it also gives origin to lymphatics which leave the bronchi at the place where they divide and at the distal end of the ductuli alveolares accompanying the veins which arise at the same place. Beyond the ductuli alveolares no lymphatics are present in the walls of the air spaces.

While throughout the lung the lymphatics are, as a rule, destitute of valves, a valve is present at the junction of the venous (deep) lymphatics with the pleural (superficial) lymphatics. This valve opens toward the pleura.

In the pleura there is a very rich network of lymphatics which contain numerous valves. This network communicates with the deep lymphatics of the lung which extend to the pleura along the pulmonary vein, but the presence of valves at the point of union permits of lymph flow, or injection masses, in only one direction. It is only in occasional instances the valves can be forced and injection made to enter the deep lymphatics from the superficial network.

In the lymphatics of the bronchi, of the arteries, of the main venous trunks and the greater part of the pleura, the flow is toward the hilum of the lung. In the lymphatics about the veins the flow in those vessels, which are situated just beneath the pleura and communicate with the pleural network of lymphatics, may be toward the pleura. This probably explains why we may find tubercles in the pleura and none in the deeper part of the lung.

The distribution of lymphoid tissue within the lung and the relation which it bears to the air passages, the blood vessels, the lymphatics and the pleura should interest not only the pathologist, but also the clinician, for these masses frequently serve as centres to which disease processes may be conveyed through the lymph stream.

Among the larger divisions of the bronchial tree, true lymph nodes have been described and figured by a number of investigators. In each instance they were found in the angle formed by the dividing bronchi. In the normal bronchioli respiratorii and ductuli alveolares, Miller has failed to find lymph nodes or lymph follicles, but has found masses of lymphoid tissues which were situated between the muscle coat and the accompanying branch of the pulmonary artery.

In the pleura we always find a small mass of lymphoid tissue associated with the place where the radicles of the pulmonary vein unite to form a venous trunk and the lymphatics associated with the venous trunk join the pleural network of lymphatics. The amount of lymphoid tissue present at this point varies with the age of the individual and the amount of pigment present being increased in amount the older the individual and the greater the quantity of pigmentation.

Lymph nodes and lymph follicles have been described as present in the pleura. Miller does not recognize them as normal structures. They are, in his opinion, always pathological, taking their origin from the presence of irritating substances, like particles of carbon; or as hyperplasia of already existing lymphoid tissues, as in leucaemia. In the latter case pigmentation is usually absent.

General Considerations. In studying the x-ray image of fluorescent screen or plate we find it convenient to divide the thorax into three divisions, which we have been pleased to call the zones of Baetjer. The first division from the sternum to a line drawn about one inch beyond the sternal border and running down the chest, we speak of as the first zone. This takes in the edge of the mediastinum and roots of the lungs. Zone two extends from that line to the mammillary line. This comprises the central zone of the lungs. Zone three is that portion outside of the mammillary line extending to the periphery.

The large central shadow observed in the normal thorax is due to the heart and mediastinal contents. Extending out laterally are the heavy shadows caused by the large or stem bronchi. On the right side ascending and descending bronchi are distinctly seen, but on the left, due to the intervention of the cardiac shadow, the greater part of the descending bronchus is not visible. The density of these shadows increases with age, being as a rule, much heavier in the adult. Radiating from these course markings are finer lines which project into the lung field for varying distances, but do not extend normally to the surface of the lung. These markings are produced by the walls of the bronchi and the blood and lymph vessels with their contents.

In normal individuals up to thirty years of age where there has been no infection, the bronchial tree can be traced distinctly through zones 1 and 2, zone 3, as a rule, being free from the tree. This is due to the fact that the subdivisions are so fine and the fibrous sheath around them so slight that it is not sufficient to cast a shadow. Beyond thirty and especially so in old age, the chronic infections such as bronchitis, influenza and pneumococci infections have caused a certain amount of inflammatory changes in the bronchi so that the entire tree as it were, becomes thickened and in such cases can be traced completely to the periphery. This, however, may have no pathological meaning. Therefore, in the examination of an individual we have to determine what is normal for that individual. In other words, we must know his age and picture to ourselves what change would take place for that age. For example, the lung of a man of seventy might be perfectly normal when his age is taken into consideration. On the other hand, if we get the identical roentgenogram in a man of twenty it would be a pathological condition.

X-ray Classification. Chronic pulmonary tuberculosis is a disease of such varied manifestations that a classification upon any absolute basis is almost impossible. From an x-ray-point of view, cases naturally group themselves into those showing glandular involvement as in children, those showing peribronchial infiltration and those showing parenchymatous change. Any or all of these types may be found in those patients classified as incipient or moderately advanced by the standards of the National Association for the Study and Prevention of Tuberculosis.

In the glandular type of tuberculosis, whether seen in children or adults, there is a mediastinal group and a pulmonary group of glands to be considered. Barjon follows the anatomical description of de Mussy and Barety. The mediastinal group includes all the tracheo bronchial glands, that is the two pretracheo bronchial grouping, right and left and the intertracheo bronchial grouping. These glands

are located in the median line between the sternum and vertebral column in relation to the important organs of the mediastinum. Hence, their x-ray images will be mediastinal images and when infected will give quite a different picture from the normal in roentgenoscopy or on the x-ray plate. Unless enlarged to such an extent that they extend beyond the median shadow they are best seen in oblique position at the level of and above the sixth rib, posteriorly. Infection of these glands alone usually follows the infectious diseases of childhood and on examination are revealed as an indefinite shadow mass in the otherwise normally clear mediastinal space, when viewed obliquely. Usually they are infected along with the pulmonary group and when greatly enlarged are a source for differential diagnosis from Hodgkin's disease, specific aortitis, dilatation of the aorta and persistent thymus in children. The latter shadow is usually rectilinear, symmetrical and homogeneous in density, whereas the shadow cast by tracheobronchial glands is irregular, scalloped and of varying density.

The hilus group is made up of many intrapulmonary peribronchial glands. These glands have a lateral location just within the second zone. Adenopathy of the hilus group, while directly related to the condition of the lung often do not give rise to any special clinical symptoms and are found with simple bronchitis, and bronchiectasis. Early tuberculosis of the hilus group with caseation without parenchymatous lesions is common in children. Infection of this group of glands is well seen in dorsal or ventral plates, appearing as discreet areas of increased density more or less well defined depending upon the stage of the pathological change, being well marked off in the caseated and calcified variety.

In some ten per cent. of cases of pulmonary tuberculosis with positive sputum the only roentgen finding is an increase in density of the bronchial tree and its associated blood and lymph supply. This is spoken of as peribronchial thickening. In ordinary bronchitis this same change is noted on roentgen examination, although in this condition the peribronchial thickening is usually bilateral, symmetrical in distribution and seldom, especially in the young, extends to the periphery. When this infiltration of the bronchial tree can be followed to the periphery and is more marked in one lobe than another the possibility of it being a tubercular change cannot be put aside lightly.

In the great majority of lung cases examined, some parenchymatous changes can be made out ranging from isolated areas of increased density consistent with conglomerate tubercles to areas of exudation, consolidation, fibrosis, cavity formation through the whole gamut of tubercular pathological changes.

Etiology. Speaking with precision, an etiological diagnosis cannot be made from the appearance on the roentgen plate or screen alone, for after all the finding of the tubercle bacillus in the sputum is the only absolute criterion of the disease. There are, however, certain changes noted in the parenchyma and seen as minute islets of increased density in selected localities (the first and second interspaces near the median triangle and toward the periphery of the lung near the angle of the scapula) which represent conglomerate tubercles such as one sees on gross section of the lung at necropsy. These roentgen findings seem pathognomic of tuberculosis. Other lung changes noted can be due to infecting agents other than the tubercle bacillus.

Early Diagnosis. The question is often debated as to how early can a roentgen diagnosis of tuberculosis be made. If by "early" is meant the mythical pretubercular period, one must answer that it can't be done by x-ray or any other means. If by "early" is meant incipient tuberculosis according to the classification of the National Association then without question can a diagnosis be made by x-rays in competent hands. It is in this very type of case that the x-ray is most useful. Our experience repeatedly has been that cases referred as incipient tuberculosis with or without positive sputum prove on x-ray examination to be moderately advanced and even advanced as classified by the standards of the National Association.

Certain clinicians hold that a diagnosis of incipient pulmonary tuberculosis in the prebacillary stage is justified in the absence of either constitutional or local signs and symptoms. But is not such a diagnosis open to the same line of attack so persistently launched against a roentgen diagnosis?

Granted that local and constitutional signs are present and the bacillus absent, is it not true that these same signs and symptoms are found in non-tubercular chests? The clinician

replies, "Ah! but experience has taught me that such local and constitutional signs are indicative of early pulmonary tuberculosis." While in the same breath he wishes to rule out of court the roentgenologist who bases his diagnosis on experience. This, I offer here, simply in the interests of clear thinking.

A plea has been made for common sense in the diagnosis of pulmonary tuberculosis. Let me plead to do away with the nonsense of categorically denying the value of roentgen diagnosis. To state without proof that the x-ray is more ornamental than useful not only displays a lamentable amount of insularity but a distressing degree of ignorance of the very positive results obtained by a score of serious-minded roentgenologists during the past decade.

Prognosis. To make a diagnosis of evidence of tubercular infection by x-ray or physical signs is one thing and to state that an individual is one of the tuberculous sick, quite another. For there is satisfactory evidence that most humans have been infected with tuberculosis in childhood when the pulmonary lesions passed unnoticed because they gave no clinical signs of their presence. However, as Hamman points out, these lesions have left a very definite mark of their visit and the lungs thus affected are structurally never the same as they were before the infection, at least one-third of all adults show persisting abnormalities, which may be detected by auscultation and percussion. The x-ray shows such abnormalities in larger number, so that when one hundred men come before us for examination we know at once that at least 70 per cent. are tubercularly infected. Also, that out of this 70 only four or five develop the disease, which strikingly illustrates the necessity of making the distinction between the tubercularly infected and the tuberculous sick, and percussion and auscultation are only two means for diagnosis and by no means the most important. The real problem is, to determine which four out of the 70 will develop the disease. The solution of this problem Hamman believes is directly proportionate to the extent of pulmonary involvement, although a history of previous attacks also has its bearings. Surely no one can gainsay that the x-ray in the great majority of instances will definitely portray the extent of the pulmonary involvement.

Roentgen ray examination will show that not all so-called incipient or moderately advanced cases have the same type of pathology and what is more important in classification and prognosis than the type of pathology present? The roentgen ray in the majority of cases reveals a more extensive lesion than is found by physical signs. Not only the extent but the x-ray appearance of the lesion is of value in prognosis. The so-called interlobar pneumothoraces which show as annular areas of increased density on the x-ray plate are often definite evidence of softening of the lung. These areas probably represent the so-called silent cavity. Their true significance was not appreciated until the careful study of Sampson, Heise and Brown. These pneumothoraces are rarely diagnosed clinically and indicate a somewhat graver prognosis. There is no doubt but that in experienced hands the question of activity may be decided by x-ray alone. Well-defined calcified areas of increased density, surely are old processes. Fibroid changes we know denote chronicity. Well walled-off cavities denote healing. Obviously a cavity partially filled with pus must denote activity, just as do hydro and pyopneumothorax.

Repeated examinations by x-rays will often determine the activity of the lesions present and so intimately affect the prognosis. This does not mean at all that constitutional signs are to be discarded. I want to emphasize again that there are definite x-ray signs that are the basis of a roentgenologist's faith and he has a right to interpret them. But one is to remember that the term "roentgen diagnosis" means only just that and nothing more. It is not always the final or correct diagnosis.

Regarding roentgen ray findings as a control of physical examination only a modicum of experience is necessary to learn soon that mediastinal shadows though dense often give no physical sign. Glands enlarged sufficiently to cast definite shadows to x-ray illumination are still quite beyond the reach of percussion and auscultation. Increased density of the bronchial tree is discoverable only when the increase is unusually marked and extends close to the surface of the lungs in the region of the apices. It is common knowledge among well-informed clinicians that patients who on physical and constitutional signs are incipient when examined by the x-ray pass on to a more advanced stage, how in some supposedly moderately advanced cases one finds cavities where physical signs gave no evidence of them. Law-

rason Brown reported three cases of cavity in one week, in all of whom no physical signs whatever were present. There was proof that there were cavities by change of fluid level. Chests which give physical signs at the left apex for instance, will, on x-ray examination, show pathology of the right middle lobe. Then, too, we have become so accustomed to talking about the apices of the lungs we forget about the apices of the lobes. That is the favorite location for tuberculosis. Often the roentgenologist will find the apex of the right middle or lower lobes pathological when no physical sign is present at the apices of the lungs.

Conclusion. I have purposely avoided statistics at this meeting. We have in preparation a statistical study of cases seen at the Boston Consumptives' Hospital during the past three years. What I hope I have accomplished is, to impress you with the fact that the competent roentgenologist is justified in making a diagnosis of pulmonary tuberculosis. I have seen almost everything from specific aortitis and aneurysm to new growth of the liver, Hodgkin's disease, chronic cardiac and renal disease with secondary lung signs called tuberculosis after examination by competent internists.

Whether or not a process is tubercular is rarely decided by the x-ray alone. It is decided with still greater rarity by physical signs alone. As diagnosticians we need all signs and all symptoms, the clinical history and the laboratory findings. Let me conclude with the words of the dean of roentgenologists in this country, Dr. A. W. Crane, "Let not the consulting room of the internist, the laboratory and the x-ray room become chambers of discord. The diagnostician without the x-ray is blind, but he who is without the stethoscope and percussion are deaf. Let not the deaf argue with the blind, for such is without profit. But, let the deaf put away their deafness and the blind put away their blindness. Then will a miracle come to pass . . . . . that the art of diagnosis will have a new birth."

SAMUEL FULLER, THE PILGRIMS' DOCTOR.

BY CHARLES H. BANGS, M.D., BOSTON.

"AND in the end (after he had much helped others) Samuel Fuller, who was their surgeon and phisition, and had been a great help and comfort unto them" died. He was "a man godly, and forward to doo good, being much missed after his death." Such is the tribute paid by Bradford, the historian of the Pilgrims, to Samuel Fuller who came with them in the Mayflower to Plymouth in 1620 and spent the remaining thirteen years of his life in Plymouth Colony. He ministered not only to the Pilgrims and the natives, but was also called upon to render medical assistance among the Puritans as well. His home appears to have been in the present town of Kingston; but at the call of Humanity, wherever his services were needed, Samuel Fuller performed the duties of his profession from Cape Cod to Cape Ann, traversing the pathless forests and sailing the uncharted waters to take relief to the suffering. Serving the colonists constantly in his professional capacity from 1620 until his death in 1633, we believe that he fairly earned the title of First Resident Physician of New England.

His ministrations extended outside the bodily needs of the colonists for, as a deacon, he ministered to the spiritual needs of the community that was so closely associated with the church. It is evident that he endeared himself to all, both by his professional ability and by his upright life. Not only did he bear his burdens in Plymouth Colony but he was more than once called to Charlestown and Naumkeak (Salem) and to Mattapan (Dorchester) to combat epidemics in those places.

The letter of Governor Endicott to Governor Bradford testifies to the high esteem in which he was held in the Massachusetts Bay Colony. Little is known of the early life of Samuel Fuller except what we gather from the records of of the parishes of Redenhall and Wortwell in County Norfolk, England. By these records it appears that he was one of the eighteen children of Robert Fuller, butcher, to be baptized between February 18, 1564, and October 31, 1591. The date of Samuel's baptism is recorded as January 20, 1580, which shows that he was a man of middle age when he came over in the Mayflower. His wife and one child joined him by a later ship and two children were born to them in Plymouth Colony.

It may be inferred that he was one of the more prosperous of the Pilgrims since he brought with him a servant who died as they neared the land. Previous to the embarkation of the Pilgrims he was a deacon in Rev. John

Robinson's church in Leyden. That he took an active part in the Pilgrim migration is shown by a letter written June 20, 1620, to John Carver and Richard Cushman. This letter, which was signed by Samuel Fuller, William Bradford, Isaac Allerton and Ed. Winslow (in the order named), was a vigorous protest against certain proposed measures whereby "yt the marchants should have half of mens houses and lands at ye divident" etc. In this transaction Samuel Fuller was associated with those who were the ablest among the Mayflower Pilgrims and indicates that he was a man of importance in the business affairs of the organization. This is further borne out by the fact that he was the eighth signer of the Mayflower Compact, that most important American document. As a deacon in the church at Plymouth he took an active part in its affairs, and benefits are even now accruing to the church as the result of his farsightedness and devotion. His spiritual council seems to have been sought equally with his professional advice.

The following is taken from "Plymouth and the Pilgrims," by Arthur Lord:

"John Pory, on his return, in 1622, from Virginia to England, stopped for a brief visit in Plymouth. He writes the Governor that 'for the space of one whole year of the two wherein they had been there, died not one man, woman or child.' Captain John Smith, writing in 1624, says: 'The place (Plymouth) it seems is healthful for the last three years . . . . there having not one died of the first planters.' "

In 1628 and again in 1629 he went to Charlestown and Salem at the request of Governor Endicott to combat epidemics of scurvy and infectious fever which had been brought in by the newly arriving ships. Governor Endicott sent for him because there was no physician in the Massachusetts Bay Colony and because he had heard that "here was one that had some skill in yt way, & had cured divers of the scurvie, and of other diseases, by letting blood, and other means." May 11, 1629, Governor Endicott wrote to Governor Bradford:— "I acknowledge myself much bound to you for your kind love and care in sending Mr. Fuller among us."

With the ability of the physician Dr. Fuller evidently combined the skill of the diplomat, for his visit to Salem and his meeting with Governor Endicott brought a much more cordial relation between the two colonies. It also resulted in a reconciliation of much of the disagreement between them as to forms of worship, led to an acquaintance between the two Governors and eventually helped to establish the union of the Plymouth and the Massachusetts Bay Colonies under a single government.

To Mattapan (Dorchester) Samuel Fuller was called in the summer of 1630 to combat an epidemic in which he treated some twenty of the people. What may have been the nature of the epidemic we do not know. What were the merits of the treatment in the light of modern medicine we have no right to discuss. While there is nothing to indicate the source or the profoundity of his medical education, there is evidence that he practised in accordance with the standard of his times. As well may we assault the teachings of Hippocrates and Galen as to compare the work of this pioneer in medical practice in New England with the medical science of America today.

Suffice it to say, he served well the people of his day, according to the standards of his profession. He won the confidence and esteem of his associates both by his professional skill and his exemplary life. He won the love of the community which he served by his devotion to its wellbeing. "A man godly, and forward to doo good, being much missed after his death." What better epitaph need be written.

The recent years have produced only one medical service bearing any comparison to that of Samuel Fuller,—that has been the devoted sacrifice of Dr. Wilfred Grenfell in ministering to the people of Labrador. For his devotion to duty Dr. Grenfell has been honored with knighthood.

How may we honor Dr. Samuel Fuller, the Pioneer Resident Physician of New England? In this tercentenary year should we not do something worth while to perpetuate the name of the Pilgrim's doctor? No deeds of arms or thrilling romance have given him a place in poesy. No royal commission nor high office has made conspicuous his name in colonial history. Yet he who simply served should have his well deserved place in the Pilgrims' Hall of Fame at this time when the thought of the world is turned toward the struggles and the achievements of the Pilgrims. Shall it not be the privilege and the pleasure of the medical profession of this entire country, regardless of the cleavage of lines of practice, to unite in estab-

lishing a suitable memorial to Dr. Samuel Fuller, the first doctor to acquire permanent settlement on these shores?

Clinical Department.

MALIGNANT DISEASE OF THE KIDNEY WITH UNUSUAL SYMPTOMS. A REPORT OF THREE CASES.

BY J. DELLINGER BARNEY, M.D., F.A.C.S., BOSTON,

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[From the Genito-Urinary Department of the Massachusetts General Hospital.]

FROM a diagnostic viewpoint malignant growths of the kidney demand the most thoughtful consideration and often present the greatest difficulties. If one is to entertain any hope of cure or even of relief, the diagnosis cannot be made too early. That such early recognition is generally impossible owing to the lack of symptoms or to their vague nature is well known. It is, therefore, desirable that any facts which might be of assistance in the elucidation of these sometimes obscure problems should be recorded.

The following cases came under my care recently at the Massachusetts General Hospital. Each teaches its lesson in the necessity for being constantly on the watch for the possibility of the existence of a renal tumor with vague or unusual symptoms.

CASE 1. M. H., female, 44 years old, married, white. Seen January 3, 1920, in consultation with the West Medical service to which the patient had been admitted. F. H.—Negative. P. H.—Unimportant. P. I.—For five or six months an "all gone" feeling in the lower back, but no definite pain. Profuse night sweats during this period. No cough or fever. About one month ago dull, dragging pain began in lower back and has persisted to date. Patient was obliged to go to bed. Hematuria of slight degree and intermittent has been noticed since onset of symptoms; otherwise no unusual urinary disturbance beyond slight frequency. No nausea or vomiting; no known loss of weight. P. E.—An obese woman, evidently in some distress. Heart negative. Slight dulness in right axilla with increased voice sounds. Left lower back dull with bronchial breathing; diaphragm high on the left. Abdomen pendulous and very fat. An indefinite, tender, apparently movable mass in the left upper quadrant, where there is some muscle spasm with tenderness in the left costo-vertebral angle. Blood pressure 125 mm. systolic, 75 mm. diastolic. Afternoon temperature persistently about 101 degrees. White count ranged from 13,000 to 17,000. Renal function 35% in two hours. Blood Wassermann negative. X-ray unsatisfactory on account of obesity. Catheter specimens of bladder urine repeatedly showed much pus, a few blood cells and B. Coli. Cystoscopy showed an essentially normal bladder. Catheter passed easily to either kidney, with normal flow of clear urine from the right, of which the sediment showed a few white and red cells and motile bacilli. No urine whatever was obtained from the left side, although 15 c.c. of a solution of 25% sodium bromide could be injected into the kidney without producing colic. X-ray for pyelogram showed no shadow (again doubtless due to the unusual obesity).

My preliminary diagnosis was "probably a non-tuberculous pyonephrosis, possibly due to calculus." Operation was advised.

Operation. Oblique left lumbar incision. On opening the perinephric space a large quantity of pus poured out. Culture of this showed B. Coli. There was an extensive necrosis of perirenal fat and the kidney felt soft and distended. It was not enlarged, nodular or especially adherent or vascular. At this point the patient showed signs of collapse and the wound was therefore hastily closed with drainage.

Ten days later, the patient's condition meantime having markedly improved, a second operation was performed, this time the left kidney being removed. Pathological examination by Dr. J. H. Wright was as follows:

"Kidney shows three white tumor masses with areas of softening in them. The largest is 4 cm. in diameter."

"Microscopic examination shows the tumor to consist essentially of vacuolated epithelium-like cells, resembling those of adrenal cortex. Capillary blood vessels course among the cells. There is but little stroma. The tumor tissue is degenerated in many places, and pus cells, bacteria (some of them cocci), and degenerative products are present. Diagnosis—Hypernephroma.

The patient made a good recovery and left the hospital sixteen days after the second operation.

While it is true that in this case the cardinal symptoms of renal tumor, namely hematuria, pain and tumor, were present to a greater or less degree the picture was so definitely one of an inflammatory process that the possibility of neoplasm was lightly if at all considered. Indeed, infection as a predominating symptom in renal tumor is exceedingly rare and except

for blood (which is by no means constant) the urine is often negative.

Albarran and Imbert, in their "Tumeurs du Rein," state that this phenomenon was seen by them in but two cases. They also state that one *sometimes* finds pus in the urine in the presence of renal tumor. I have no personal recollection of a similar case of infected renal tumor, nor have I come across other mention of it in the literature.

The small size and therefore comparatively short duration of the tumor in this case make the prospects of permanent cure unusually bright. But it was what one might call an accidental diagnosis, as in the absence of infection it is probable that the patient would have sought relief only after the growth had spread outside the kidney into the renal vein or the perirenal tissues.

Case 2. T. U., male, 50 years old. Entered West Medical service under the care of Dr. R. I. Lee in August, 1919. After very careful study Dr. Lee summarized the case as follows: "A baker of 50 had influenza 11 months ago. Since then weakness, anorexia till recently, and loss of weight (40 pounds in the past year). Several attacks of abdominal pain, mostly right-sided, with diarrhea for four weeks. Negative x-rays of lungs, and gastro-intestinal tract, except for visceroptosis and glands at lung roots. Very slight, but persistent fever (never over 99 degrees), and white count of over 10,000 many times. Pulse 90-100. Slight tremor and palpable and enlarged thyroid. A few white and red cells in the urine."

I might add that the blood Wassermann was negative, blood pressure 180 mm. systolic, 120 mm. diastolic, creatinin 1.57 mgm., non-protein nitrogen 45.9 mgm., phthalein kidney test 40-45%, stools negative to guiac test, red count, 4,648,000.

Patient left the hospital in September, 1919, and was readmitted in November, 1919. Diarrhea had become more marked. Abdominal pain vague. Examination of eyes showed marked arteriosclerotic changes of retinal circulation in both sides. Enlargement of thyroid more pronounced. Abdominal examination negative. Blood pressure 135 mm systolic, 95 mm diastolic.

It will be noted that throughout this careful and prolonged observation there was but little reason for suspecting the genito-urinary tract as a source of the trouble. But being unable to account for the symptoms satisfactorily a consultation with the Genito-Urinary Department was requested.

I made a cystoscopic examination on November 19, and found a normal bladder and ureters. A catheter passed to the right kidney drew clear urine, with a negative sediment and a function of 55%. Pyelogram showed an ectopic, but otherwise normal kidney. A catheter was passed 11 cm. into the left kidney but no urine was obtained.

On November 29 another cystoscopy was done. Again a catheter was passed up the left ureter but drew no urine. Pyelogram showed marked deformity of the left renal pelvis, the injected fluid (25% sodium bromide) being scattered around in irregular masses. Careful abdominal examination showed for the first time a definite, but vague mass, apparently fixed, in the left upper quadrant. A diagnosis of malignant disease of the left kidney was made. Operation was considered to be futile.

In December, 1919, an exploratory operation was performed by Dr. C. A. Porter, as there were certain features of the case which suggested pancreatic tumor.

The left kidney was found to be hard, fixed, nodular, moderately large, with metastases in the liver and the tail of the pancreas. No definite tumor formation in the kidney as in hypernephroma; probably adenocarcinoma. The patient recovered from the operation and left the hospital December 29, 1919.

Here again is a case lacking the usual textbook symptoms of renal tumor. The pain was uncharacteristic, there was no gross hematuria, and not always microscopic blood. The enlarged kidney was overlooked entirely at first, and but vaguely felt even when attention was focused upon it. After finding many things wrong with the patient, none of them, however, the primary source of trouble, the medical service asked for a urological consultation as a last resort. It is hard to see how diagnosis could have been made much earlier unless one should go to the extent of including a complete investigation of the genito-urinary tract as part of every routine examination.

Case 3. A. M., male, 58, white. Admitted to the Genito-Urinary service October 7, 1919, for hematuria, with a diagnosis (by his doctor) of "Malignant disease of the bladder." P. H.—For the past three or four years has had indigestion and vomiting at times. None lately. Five months ago he began to have pains in the back, at times severe enough to keep him in bed. Pain mostly on the right side and in the hip and knee. Joints never swollen or red. Pain in the back grew less and less, and pain in the knee increased till he finally went to a hospital where an x-ray was taken which showed "thickness in his bones." A plaster spica was applied with some relief. P. I.—Three days ago he began to have bloody urine. No previous urinary symptoms. Occasional nocturia, no urgency or frequency. Thinks he

has lost ten to twelve pounds in the past three months. P. E.—Fairly developed and nourished. Heart and lungs negative. Slight tenderness over lower spine. Abdomen lax, tympanitic, no masses or tenderness. No organs felt. Genitals negative. Considerable tenderness over great trochanter on the right. Reflexes normal. Prostate soft, slightly large. Blood pressure 180 mm. systolic, 100 mm. diastolic. X-rays of genito-urinary tract negative. Urine very bloody, sediment showed nothing but blood. Soft catheter passed easily to the bladder withdrawing about eight ounces bloody urine.

Catheter drainage for 48 hours with cessation of hematuria.

On October 10 cystoscopy under local anesthesia was attempted but owing to marked irritability of the urethra nothing was accomplished.

On October 14, the urine meantime being clear, spinal anesthesia was given for another cystoscopic examination, in order to determine the source of bleeding. Anesthesia was given easily with the patient sitting on a flat table. The patient was then lifted to an operating table in order that he might be put in the lithotomy position. After this move it was noted that the right femur was fractured in its upper third, a mishap which had occurred without the knowledge of the patient or of those in attendance. In spite of this and in the belief that thorough investigation was important, cystoscopy was performed and the ureters catheterized. There was a normal jet from each kidney. The sediment of the right urine (except for a little blood) was entirely negative and the phthalein test (intravenous) showed an appearance time of six minutes with a function of 40%. The sediment of the left urine showed much blood and a few white cells. Phthalein appeared in six minutes with a function of 35%. The exigencies of the case made a pyelogram at that time seem unwise. Subsequent investigation by x-ray showed that almost the entire right femur was replaced by new growth.

The patient was transferred to the West Surgical service where after some deliberation a hip-joint amputation was performed from which the patient made a good recovery. Pathological examination showed almost the entire shaft of the femur to be invaded by necrotic new growth, which on microscopic examination proved to be adenocarcinoma.

In this case the presence of sudden, unprovoked and "total" hematuria, together with some loss of weight in a man past middle life naturally aroused a suspicion of malignant disease, but whether of kidney or bladder could not be told without cystoscopy. The subjective and objective leg symptoms did not, however, occur to anyone as being due to a possible metastasis.

The fracture of the leg while absolutely unavoidable was none the less a most unfortunate affair, and one which might very properly put the surgeon in an awkward position. While one would undoubtedly prefer to make his diagnoses in a different way, this accident furnished the diagnosis at once, not only as to malignant disease, but also localized it to the kidney as malignant renal tumors seem to have a predilection for the long bones.

REPORT OF A CASE OF ACUTE ENCEPHALOMYELITIS WITH AUTOPSY.

By Howard Osgood, M.D., Buffalo, N. Y.

The following case of "encephalitis lethargica" is of interest because it was under continuous observation from onset until the fatal outcome, and because the diagnosis, obscure in the beginning, was corroborated by post-mortem examination.

The patient, male, aged 58, white, a broker, was seen for the first time at his home in vicinity of Boston on May 1, 1920.

History. Family History—Father died, cause unknown. Mother died of cancer. Patient has been married twice. One child by first wife is living and well. First wife divorced. Second wife living and well; no children. Past History—In early manhood, the patient went West for a short period for his health. He is said to have had "ambulatory typhoid" many years ago after his return from the West. Since then he has had no serious illness. He has not had influenza. He has taken very good care of his health, spending much of his leisure out of doors. During the past winter he has regularly frequented the gymnasium. For two years he has felt below par, without definite symptoms; circumstances of his life have not been very happy. He has not been troubled with headaches, colds or sore throat. No *cardio-respiratory* symptoms. Gastro-intestinal—For the past two years or so once or twice a month, he has had a sense of fulness immediately after eating, especially when tired at night, relieved by induced vomiting. Vomitus which is not increased in amount, consists of food just eaten. No pain or hematemesis. Unless he is careful of his diet, the symptoms are aggravated. For the past few weeks, this fulness and vomiting have occurred two or three times a week. He is habitually troubled with constipation and flatulence; bowels regulated by a mild laxative four to five times a week. No diarrhea; no bloody, tarry or clay-col-

ored stools. Genito-urinary—Micturition $\frac{D\cdot 4\cdot 5}{N\cdot 1}$ Nocturia for several years. No other symptoms referable to the genito-urinary tract. Questioning elicits no symptoms in the past referable to the *neuromuscular* system. He is, however, reticent by nature, and has worried a good deal about his health. For the past year he has shown a tendency to doze off in the evenings, and has gone to bed early. He has been under considerable strain from worry and long hours at his business for four or five months, and has been troubled with insomnia. Skin—Face and hands tanned from exposure; never any jaundice. Weight—Best, 185 pounds 25 years ago; present, 150 pounds, stripped. Habits—Rarely tea or coffee; rarely tobacco. No alcohol or drugs. Present Illness—The patient gives April 30 as date of onset. For several weeks preceding he had felt tired and dull. Two weeks previously the author chanced to be present at a small dinner with him. At that time, he appeared tired and pale and unusually quiet, jokingly apologizing to his hostess for his lack of conversation. About the same time he had remarked to a business associate at his usual lunching place that "he could go to sleep in his chair."

On April 30, patient felt very tired at work and had no appetite. He came home in the evening feeling feverish. Was restless and vomited once or twice that night. He did not believe that he had had fever before the day of onset. He had considerable discomfort from gas in the bowels and complained of "deep breathing" at night which tired him. He stayed in bed the next day, eating very little. Vomited again three or four times without effort, vomitus chiefly bile. There was a slight nosebleed once after vomiting. No headache, abdominal pain, respiratory or genito-urinary symptoms.

Physical Examination, May 1, 1920—A well developed and nourished man lying quietly in bed, not appearing very ill, conscious and rational. Complains of "gas in the bowels." Hair iron gray and plentiful. Skin of face, neck and hands brown and weatherbeaten, rather sallow. Sinuses—No tenderness. Eyes—conjunctivae pale; no jaundice. External ocular movements normal, no nystagmus. Pupils round, right slightly larger than left, both react promptly to light. Nose—No obstruction or discharge. Teeth—Good. Tongue—Clean; protrudes in midline without tremor. Throat—Slight general redness. Tonsils—Negative. Lymphnodes—Cervical, epitrochlear and axillary not enlarged. Heart — Size normal; sounds rather faint. $A^2>P^2$. No murmurs. Blood vessels not palpably sclerosed. Lungs negative throughout. Abdomen flat, soft, hypertympanitic. Liver edge just felt on deep inspiration; not tender. Gall-bladder not felt, but some local voluntary rigidity; Spleen and kidneys not felt. No masses or tenderness. Costo-vertebral angles negative to palpation. Genitalia not examined. Reflexes—Knee and ankle jerks active and equal. No Babinski. No neck sign. Skin, clear; no rose spots. Blood pressure $\frac{144}{80}$. Blood smear — Polymorphonuclear neutrophiles, 60%; small lymphocytes, 28%; large lymphocytes, 8%; large mononuclears, 4%; eosinophiles, mast cells and myelocytes, 0; reds and platelets normal. Urine (morning specimen)—Amber, slightly cloudy. Acid, Sp. Gr. 1017. Alb. ? trace (heat). Sugar ± (Benedict). Diacetic and Bile—0. Sediment—Much thin mucoid, prostatic secretion. Many minute oblong crystals. Few cylindroids. One coarse granular cast seen. Few epithelial cells. No pus or blood. Stained smear negative.

Provisional diagnosis in absence of definite findings—A mild acute gastro-enteritis of unknown origin. Treatment—Castor oil, then milk of magnesia, soft solids and bed.

Course of Disease—During the next week the temperature ranged from 99 in the morning to 102 in the afternoon, subsiding to 99 on the afternoon of May 6. The patient showed a slight tendency to somnolence and complained of lack of appetite; several nosebleeds. Further physical examination disclosed a large, firm, non-tender prostate; no rigidity of neck. Otherwise there seemed to be an improvement. White count, 5,600. Blood culture, stool culture, Widal and blood Wassermann were all negative (Dr. F. B. Mallory's laboratory).

Acute retention of urine developed on May 7, with considerable spasmodic pain in bladder, relieved by morphia. He was seen in consultation by Dr. H. H. Crabtree and was removed to the New England Baptist Hospital where a suprapubic cystotomy was done under local anesthesia, preliminary to prostatectomy, the acute illness apparently having subsided. During the operation the patient evinced remarkably little reaction nervously. Before the operation, it was noted that the patient was a little deliberate in his gait, especially when turning, but at the time it was attributed to the effects of the morphia. From that time on, however, he became distinctly more dull.

After the operation there was almost complete suppression of urine for 36 hours, a rise of temperature, and great drowsiness, later followed by satisfactory diuresis. Blood pressure $\frac{145}{90}$. Urine—Cloudy, alkaline, very large trace of albumen (heat), no sugar or diacetic acid. Blood chemical examination (May 10)—Urea nitrogen 13.98 mgm. per 100 c.c.; non-protein nitrogen 41.5 mgm. per 100 c.c.; chlorides 497 mgm. per 100 c.c.

During the next few days the albumen diminished; no casts were seen. Irregular fever persisted, however, with pulse between 100-120; respiration 25. The patient was very drowsy at times during the day, lying semi-recumbent with little effort to change position. He complained of insomnia at night; his nurse re-

ported that he slept only in naps. There was obstinate distention, temporarily relieved by enemata and rectal tube. Phenolsulphonephthalein test (May 12)—Appearance time 13 min.; first hour, 17%; second hour, 25%; total 42%.

Daily notes are given below as they show the progress of the disease better than a summary. May 13—Not taking nourishment well. Patient has begun to have drenching sweats several times a day. Night nurse reports that he "jumps" frequently in his sleep. White count, 10,200. P. E.—Heart and lungs negative. Abdomen moderately distended; wound clean. On this day ptosis of left eyelid developed; no palsy of other ocular muscles or of face or tongue. Doubtful Babinski on left; slight weakness in lifting left leg from bed. Deep reflexes normal. Ophthalmoscopic examination, atropine dilation: right eye, disk sharp, vessels normal; retina negative as far as seen. Left eye, some refractive error distorts disk, which seems normal; retina negative.

May 14—Patient slightly delirious; breathing regular, 28 per minute, but almost hyperpnoeic in character, not periodic; intervals of tachypnoea. In addition to pareses noted before there is weakness of left frontalis muscle, expressionless face and drooping of lower jaw. Fine muscular twitchings in calves and biceps, almost fibrillary in character. Slowness and uncertainty of voluntary movements; slight bilateral ataxia in heel to shin and finger to nose tests. Questionable clonus on left. No Babinski. Fingers are held straight, and flexed at metacarpo-phalangeal joints, thumbs approximated to side of index finger. Feet adducted and plantar-flexed at ankle; toes flexed at metatarso-phalangeal joints, interphalangeal joints straight; big toes slightly adducted and straight; Chvostek's and Trousseau's signs absent. General mild rigidity of muscles of extremities. Resistance to extension of legs at knee with thigh flexed, but no pain. Sensation tested roughly with hand and sharp point normal. Lumbar puncture; pressure 8-12 c.m., fluid crystal clear; cells 4-6 per cu. m.m. Globulin 0, Wassermann 0; no clot formed over night in ice-box.

Seen in consultation by Dr. E. W. Taylor. At this time patient showed unexplained stupor, probable ptosis, apparent external strabismus, blurred fundus with no hemorrhages, nasal side of both disks indistinct, a probable right Babinski; other reflexes normal; weakness of right side of face. Dr. Taylor made a probable diagnosis of encephalitis lethargica.

May 15—White count 10,200. Blood pressure $\frac{130}{95}$. Blood culture sterile. Blood chemical examination (taken two hours after a cup of coffee with cream and sugar and a half hour after 8 ounces of milk)—Urea nitrogen 17.71 mgm., non-protein nitrogen 42 mgm., blood sugar .116 mgm., chlorides 562 mgm. per 100 c.c. CO_2 capacity 42.

Patient bright in the morning, but lapses into stupor during day; intelligent response when roused. Ear drums negative. Ptosis now bilateral, convergence weak. Tongue not fully protruded in mid-line; tremulous. Voluntary movements deliberate with coarse intention tremor.

May 16—White count, 23,000; temperature, pulse, and respiration climbing; perspiring freely. Rarely makes spontaneous remark. Pupils dilated, oval, fixed (three days after atropine in the eyes). Fundi—Right disk slightly more blurred than before. Heart dilated to left; rate 140 per minute. Lungs—Fine consonating râles at left base, faint dulness at right base. Acute decubitus developing over sacrum and right great trochanter. Swallows liquids fairly well but holds solid food in mouth a long time before swallowing. Food accumulates between teeth and cheeks.

May 17—Patient very stuporous. Replies to direct questions rationally but briefly. Coarse clonic tremor appears in the limbs when disturbed, which lasts for several minutes. Pupils as before, right larger than left. Neck stiff. Knees resist extension without pain. When roused, he can differentiate position of toes when placed up or down. Small patch suggestive of pneumonia at right base. Rectal examination by Dr. Crabtree showed prostate firm and smaller than before operation; not tender. No evidence of any inflammatory process anywhere about rectum. Epididymes normal.

May 18—Temperature, pulse, and respiration higher. Definite bronchopneumonia at left base. Loose cough but unable to raise sputum on account of weakness. Tremor as before, more marked in legs than in arms. Tongue protruded in midline with tremor; patient can open jaw about 2 cm., no spasm of masseters. Unsustained bilateral clonus; general muscular rigidity increased; grip weaker, right feebler than left. Neck somewhat stiff but not painful; positive Kernig without pain. Stupor more continuous; profound at times during the night with deep breathing; roused with greater difficulty; replies in monosyllables but understands questions. Considerable bloody oozing from bladder.

X-ray pictures taken in bed showed patch of broncho-pneumonia at right base; kidneys, ureters and bladder negative (Dr. J. R. Healy).

After disturbance for x-rays there was tremor of the lips and jaws, and the respirations rose to 50 per min. Lumbar puncture (12 hours ante-mortem): 15 c.c. crystal clear fluid; pressure 12 cm. Cells 3 to 4 per cu. m.m. Globulin positive (one plus). No clot after 24 hours in the ice-box. Gold sol 0011000000. White count on blood, 32,200. Reds slightly achromia; platelets normal. There were many polymorph. neutrophiles two to

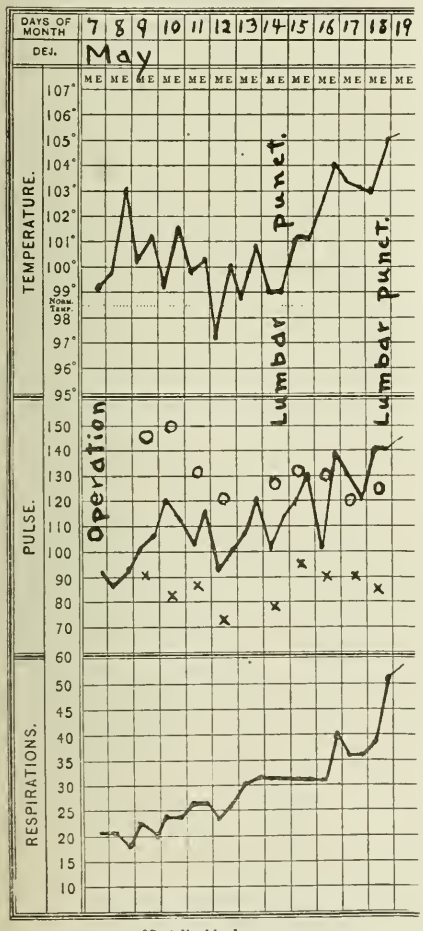
Differential:

Polymorph. neutrophiles, normal	77.7%	90.0%
Large granular neutrophiles	13.2%	
Small lymphocytes		3.6%
Large lymphocytes		1.8%
Large mononuclears		3.6%
Eosinophiles, masts, myelocytes, and blasts		0.0

three times the usual size, with lobulated nucleus and many rather large neutrophilic and basophilic granules. No phagocytosis seen.

Atropine gr. $\frac{1}{150}$ subcut. at 5.15 P.M. and again 8 hours later.

May 19—Patient failing rapidly. Recognized relative and said "Good morning." Respirations rapid, regular, but gasping; very little moisture in trachea. Quality of pulse varied



°Systolic blood pressure.
*Diastolic blood pressure.
Last four days, temperature taken per rectum.

but remained fairly strong. Patient recognized wife an hour before death, then became unconscious. Respiration became more gasping and shallower; ceased at 9.53 A.M. The heart stopped 3-4 minutes later after becoming absolutely irregular.

Autopsy was performed 4¾ hours post-mortem by Dr. F. B. Berry of Dr. F. B. Mallory's laboratory.

Body length 169 cm. Age 58 years. The body is that of a well developed, well nourished, middle-aged, white male. There is moderate lividity but no rigor mortis or oedema. The face is somewhat long, oval and narrow, and both it and the neck are somewhat tanned with constant exposure to the weather. The left pupil is .6 cm. in diameter and round; the right is oval, and measures 1x.8 cm. There is a median suprapubic incision 7 cm. in length. The upper 4 cm. are recently healed and still contain four interrupted silk worm gut sutures. The lower 3 cm. are open and a large rubber drain is inserted. The wound edges all appear clean.

Peritoneal Cavity. The intestines are slightly distended. There is no evidence of any peritonitis anywhere in the peritoneal cavity. The appendix is 6 cm. in length, free and retrocaecal. The mesenteric lymphnodes are negative. On the left, the diaphragm is at the level of the fifth interspace; on the right at the fourth rib. The liver extends 6.5 cm. below the ensiform.

Pleural Cavities. There are a few strands of old adhesions about the right apex.

Pericardial Cavity. Contains about 20 c.c. of clear, straw-colored fluid.

Heart. It is of normal size and, on opening and sectioning, the muscle is of excellent color and tone. The valves are negative except that in the mitral and about the base of both it and aortic valve there are a few yellow, sclerotic patches. Similar patches may be seen in the coronaries occasionally.

Measurements. Tricuspid valve, 14 cm.; pulmonary valve, 8.5 cm.; mitral valve, 11. cm.; aortic valve, 8. cm.; left ventricle, 1.2 c.m; right ventricle, .5 cm.

Lungs. Both apices exhibit a small amount of contraction with white fibrous scars. There are petechiae over the dependent portions of both lower lobes and on section some granular and slightly projecting irregular foci are noted. Both lungs are decidedly moist. They are otherwise large and well distended with air. The bronchi are congested and contain a very small amount of mucus. The bronchial lymph nodes are negative.

Spleen. Is small, pale blue-gray, and flabby. On section the pulp is a dull brick red and does not scrape away.

Gastrointestinal Tract. The stomach is dilated to about three times its normal size, otherwise the intestinal tract is negative.

Pancreas. Negative.

Liver. Apparently normal in size. The capsule is smooth and the color a dull chocolate brown. The gall-bladder contains a pale mucoid bile and, together with the ducts, is negative.

Kidneys. Are of equal size and shape and appear to be of normal weight. On section the cortex is well demarcated from the pyramids and shows nothing abnormal. It is about .5 cm. in thickness and the glomeruli may be seen clearly as fine transparent points. The pelves show a few punctate hemorrhages. The ureters are negative. No calculi can be found in kidneys or ureters.

Adrenals. Negative.

Bladder. There is a wound in its anterior and superior portion through which the drain is inserted. It is much contracted and its mucosa is in folds and much congested, with a small amount of fibrin on its surface.

Genital Organs. The prostate is slightly enlarged and on section shows grossly a glandular hypertrophy and dilatation.

Aorta. There are a few yellow fatty portions and in the abdominal portion these have become thickened and more fibrous.

Organs of Neck. Not examined. Nothing abnormal on palpation.

Head. The head is covered with steel gray hair. The scalp, calvarium and dura are negative.

Brain. It is normal in development and size and, save for congestion and a slight pink tint of the gray matter of the basal nuclei, shows no gross lesions. The pink color is especially marked in the pons and medulla. The middle ears are clean.

ANATOMICAL DIAGNOSIS.

(?) Encephalitis.
Hypertrophied prostate.
Recent operation, cystotomy.
Healed tuberculosis, both apices.
Healed pleuritis, right apex.
Hypostatic pneumonia, both bases.
Dilatation of stomach.

MICROSCOPIC EXAMINATION.

Heart. Negative.

Lung. The pleura is thickened and fibrosed, in one section, and there are foci of lymphocytes in it. In the other there is a bronchitis and bronchopneumonia with an exudate of polymorphonuclear and endothelial leukocytes. Many of these latter contain fat.

Spleen. Slight thickening of the trabeculae and of the walls of the arteries.

Stomach. Congestion of the mucosa and infiltration with lymphocytes and polymorphonuclear leukocytes. Some of the glands contain leukocytes.

Pancreas. Negative.

Liver. Irregular areas of congestion.

Kidney. Negative. Small adenoma.

Adrenal. Postmortem changes.

Bladder. Chronic cystitis. Epithelium thickened and lymphocytes in submucosa.

Prostate. Hypertrophy due to glandular hyperplasia and slight dilatation and chronic inflammation.

Aorta. Fatty endothelials beneath the intima.

Brain. Sections of the cortex are negative except for congestion and oedema. Sections through the basal nuclei vary. The vessels show marked hyaline change. In some sections there is almost nothing, whereas in others there is a marked lymphocytic and endothelial reaction about the vessels, diffuse infiltration of the tissues with lymphocytes, and rarely small hemorrhages. The process is most marked in the pons. The cerebellum shows a small zone of lymphocytic infiltration. The medulla and cervical cord are negative except for a slight perivascular reaction in the latter.

Hypophysis. Congestion.

Choroid Plexus. Negative.

MICROSCOPIC DIAGNOSIS.

Encephalitis lethargica.
Bronchopneumonia.
Chronic gastritis.
Small so-called adenoma of kidney.
Chronic cystitis.
Hypertrophy of prostate due to glandular hyperplasia, dilatation, and chronic inflammation.
Hyalin in arteries of brain.

WEEK'S DEATH RATE IN BOSTON.

DURING the week ending December 4, 1920, the number of deaths reported was 207 against 187 last year, with a rate of 14.43 against 12.24 last year. There were 30 deaths under one year of age against 34 last year.

The number of cases of principal reportable diseases were: Diphtheria, 51; scarlet fever, 19; measles, 22; whooping cough, 28; typhoid fever, 3; tuberculosis, 52.

Included in the above were the following cases of non-residents: Diphtheria, 10; scarlet fever 3; typhoid fever, 1; tuberculosis, 6.

Total deaths from these diseases were: Diphtheria, 7; scarlet fever, 2; tuberculosis, 12.

Included in the above were the following cases of non-residents: Diphtheria, 1.

Infantile paralysis cases,1; deaths, 1.

THE BOSTON
Medical and Surgical Journal

Established in 1812

An independently owned Journal of Medicine and Surgery, published weekly under the direction of the Editors and an Advisory Committee, by the Boston Medical and Surgical Journal Society, Inc.

THURSDAY, DECEMBER 16, 1920

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An editor will be in the editorial office daily, except Sunday, from twelve to one p.m.

Papers for publication, and all other communications for the Editorial Department, should be addressed to the Editor, 126 Massachusetts Ave., Boston 17. Notices and other material for the editorial pages must be received not later than noon on the Saturday preceding the date of publication. Orders for reprints must be returned in writing to the printer with the galley proof of papers. The Journal will furnish free to the author, upon his written request, one hundred eight-page reprints, without covers, or the equivalent in pages in the case of articles of greater length.

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Boston Medical and Surgical Journal

126 Massachusetts Ave., Cor. Boylston St., Boston 17, Massachusetts

REPORT OF THE MATERNITY BENEFITS COMMISSION.

To Dr. Alfred Worcester and his associates on the Commission on Maternity Aid and to all who gave their help, the medical profession and the citizens of the Commonwealth owe a great debt of gratitude. Few realize the amount of labor and thought devoted so unselfishly to the task assigned them. The report they have presented to the Legislature is printed almost in full in the Journal today and we ask all our readers to study it carefully. Unfortunately at the time of going to press the appendices to the report were not available.

The report and the recommendations presented should, we believe, command the support of a great majority of the medical profession. It is to be hoped that it marks the beginning of a better era. In brief, the evidence shows that the maternal death rate due to pregnancy and childbirth in Massachusetts is unreasonably high, that the morbidity rate is correspondingly high, that the proportion of still births is excessive, and that the mortality returns are not satisfactorily made.

It is considered that in a large percentage of cases both maternal and infant deaths are preventable. It is shown that pre-natal and post-natal nursing have been both in Massachusetts and elsewhere of great value. It is recommended that these two measures be provided throughout the State under the supervision of the Department of Public Health. It is further recommended that adequate obstetric nursing and household attendants be provided. In cases of need other care may be provided so that no woman shall suffer at the time of her confinement for lack of proper attention.

All of the recommendations made seem to be steps in the right direction. There are, however, many other steps to be taken in the journey of progress. The report states that obstetric practice must be improved, but suggests that this is a matter for the medical schools and the board of registration in medicine to deal with. Is it not rather a matter in which the public must be educated? Until obstetrics is recognized as a specialty in the same sense in which surgery is recognized as a specialty, can we look for great improvement in the mortality and morbidity incident to childbirth. Pre-natal nursing does much. Post-natal care does much. Nursing during labor and confinement does much; but will any of these measures change materially the deaths from septicemia which the report of the Secretary of the Commonwealth in his report for 1917 spoke of as "little short of criminal"?

Will any of these measures cut down the incidence of sepsis which Dr. J. Whitridge Williams of Baltimore says is as great today as thirty years ago? Will they decrease the deaths from the accidents of labor or will they cut down the morbidity due to injuries of delivery? Will they decrease the infant death rate or will they decrease the morbidity of infants due, for example, to cerebral hemorrhage occurring at birth? Such questions suggest the next steps to be taken.

It is to be regretted that returns of deaths due to pregnancy are inadequately reported. It is to be hoped that such returns and returns in regard to morbidity may in the future be obtained as has been suggested by a correspondent of the Journal.

The transfer of the control of lying-in hospitals to the State Department of Health would be of great benefit, and proper regulations regarding their conduct would assist in bettering obstetrics throughout the State.

Adequate hospital facilities today make modern surgery possible, and make possible the advances in scientific medicine. Trained and recognized surgeons and internists do the work in these hospitals. Can obstetric practice advance materially until adequate hospital facilities are provided in which trained and recognized obstetricians can do their work? In some way, moreover, trained obstetricians must direct the nurses which it is proposed that the State shall provide.

MEDICAL NOTES.

APPOINTMENT OF DR. ARDREY W. DOWNS.—Dr. Ardrey W. Downs, formerly assistant professor of physiology at McGill University, has been appointed to the chair of physiology in the University of Alberta.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—The meeting in Chicago of the American Association for the Advancement of Science, at which Dr. Simon Flexner, as retiring president of the Association, will deliver an address, is to be held on the evening of December 27, instead of on the following evening as it was originally planned.

APPOINTMENT OF DR. KENNETH D. BLACKFAN.—Announcement has been made of the appointment of Dr. Kenneth D. Blackfan, associate professor of pediatrics at the Johns Hopkins Medical School, to the professorship of pediatrics at the Medical College of the University of Cincinnati.

GIFT OF MEDICAL LIBRARY TO THE UNIVERSITY OF CHICAGO.—A medical library, valued at twenty-five thousand dollars has been given to the University of Chicago by Dr. Frank Billings, professor of medicine in the University. This library will form the nucleus of the clinical library of the Medical School and eventually will be housed in the Albert Merritt Billings Hospital.

APPOINTMENT OF DR. JAMES W. PAPEZ.—Dr. James W. Papez, formerly professor of anatomy and neurology at Emory University School of Medicine, Atlanta, Georgia, has been appointed assistant professor of neurology at Cornell University Medical College, Ithaca, New York.

BEQUESTS OF DR. LLOYD ROBERTS.—Included among the bequests of the late Dr. Lloyd Roberts of Manchester, England, are the following gifts to medical organizations: to the Royal Society of Medicine, £5,000; to St. Mary's Hospital, Manchester, £5,000; to Manchester Royal Infirmary and to the Royal College of Physicians, London, £3,000 each; and £2,000 to the Medical Society of London.

The Massachusetts Medical Society.

THE REPORT OF THE SPECIAL COMMISSION TO INVESTIGATE MATERNITY BENEFITS.

The Commission, consisting of Alfred Worcester, M.D., Chairman; Eugene R. Kelley, M.D., Commissioner of Public Health; Robert W. Kelso, Commissioner of Public Welfare; Edward E. Whiting of Newton, and Mrs. Helen A. MacDonald of Roxbury, have presented their report, which is here published in slightly abbreviated form.

I. THE INVESTIGATION.

The Commission found it necessary, owing to very incomplete data, to investigate the need for improvement in the care of child-bearing women and their infants.

An intensive investigation of all maternal deaths in Massachusetts for the first half of 1920 and a study of the facts in relation to infant deaths in a group of cities and towns fairly representative of the various communities in the Commonwealth, was made. Evidence based upon similar studies elsewhere was considered. The Commission believes this is the first time basic facts of this nature have been collected and studied for a state.

Six hundred to seven hundred women die in Massachusetts each year from causes due to pregnancy or childbirth. For the past five years the maternal death rate has been as follows: 1915, 48 per 10,000 births; 1916, 56; 1917, 64; 1918, 84 (high on account of the influenza epidemic); 1919, 60. A large percentage of these deaths resulted from septicaemia, toxaemia, or the accidents of pregnancy and labor.

During the first half of 1920, 354 maternal deaths were reported and the Commission was able to secure sufficient information to make an estimate of preventability in about 300 of these cases. After careful study, 39% were deemed to have been preventable.

Included among the preventable cases were those due to the toxaemias of pregnancy, septicaemia, accidents of pregnancy and labor in patients with little or no prenatal supervision or obviously inadequate care at the time of confinement, and those due to communicable diseases generally recognized as preventable. In drawing conclusions like these, certain reservations must be made. For example, "prenatal care" can hardly be said to be adequate if it includes only a call to engage a physician, who perhaps may take occasion to lay down a few general rules for the patient to follow. The death certificates may not tell the whole story. Many cases were thrown out of consideration during the compilation of these statis-

tics because the information available was so meagre as to preclude scientific classification. Unquestionably many of these unclassified deaths belong within the group of septicaemias or of other preventable groups.

In a very large majority of preventable cases the care is clearly inadequate and the number of cases which had adequate prenatal care is almost negligible. Nursing service during confinement was lacking in more than half the cases. A large number of the women are stated to have received hospital care, but almost all of these cases reached the hospital only after serious symptoms had developed. The hospital care of these cases was not prearranged, nor was there a chance for anything but emergency treatment.

No definite relation between maternal deaths and financial, economic or social conditions was disclosed. Child-bearing women of all classes, races and conditions die in unreasonably large numbers. The rapid disintegration of families in which the mother has died was very noticeable. For example, in August and September no trace could be found of many such families where the death had occurred during the first half of this year.

Infant deaths also are in large numbers preventable. During 1919, in Massachusetts, the death rate for infants under one year was 88.2 per thousand live births. More than half (45.4 per 1,000) died before they were a month old. For purposes of study, the infant deaths for the first half of 1920 were divided into two classes: first, those dying at the age of one month or less, and second, those dying between the ages of one month and one year.

In the first class, 39% of the deaths were deemed to have been preventable. As in the case of maternal deaths, the need seemed to be for improved prenatal or obstetric service. Economic and social factors did not bear a definite relation to these deaths; but nursing service was conspicuously lacking. In a large number of cases physicians were called too late to handle the case properly.

The Commission's estimate of preventability of both maternal and infant deaths is conservative in view of actual results of improved prenatal and obstetric and postnatal care obtained elsewhere. The facts set forth as to the causes of death coincide with those disclosed elsewhere. More than 3,000 stillbirths are recorded in Massachusetts each year, the rate being 34.7 per 1,000 live births for 1919. The number reported is far below the actual number. How far the rate for stillbirths can be reduced by proper maternity care is shown by the following: In a series of 4,500 cases cared for by the Maternity Centre Association of New York the rate is 24 per 1000 live births, as against 60 for New York City as a whole. Prenatal and improved obstetric care will reduce the number of stillbirths very materially.

Of the deaths of infants between the ages of one month and one year, 38% were found to have been preventable. The type of care needed to reduce this second class of cases is quite different from that required by the other groups. The figures disclosed a very much higher percentage of poor families in this latter group. Feeding, housing and economic factors here play an important part, and yet many of these little lives would have been saved had their homes been visited by nurses, giving instruction regarding feeding and otherwise assisting in the care of the infants. Gastro-intestinal and respiratory diseases were conspicuous among the causes of these preventable infant deaths. The total number of infant deaths occurring during the second to twelfth months of life, however, is about equal only to the number occurring during the first month. Nevertheless, practically all of the work intended to reduce infant mortality has been directed towards the care of infants more than one month old.

Ignorance of hygiene on the part of the members of all classes of society and all races is disclosed in all the groups of maternal and infant cases studied. Failure or refusal to take advantage of existing facilities was a common occurrence. Among 1000 infant deaths in 1919, the cases where a physician was not called at all, or made but one visit, number nearly one-half.

II. The Medical Questionnaire.

To obtain the opinion of the medical profession, a questionnaire was sent to the six thousand registered physicians of Massachusetts. Answers were received from 1,459. Of these 78 only were from physicians engaged in obstetric practice during the year 1919.

The more important questions were answered as follows:

To the question, "Would any of your obstetric patients during the year 1919 have benefited by more prenatal nursing service?", 251 answered "Yes," 543 answered "No," 645 gave no answer.

To the question, "Would any of your obstetric patients have benefited had you been able to care for them in a lying-in hospital?", 319 answered "Yes," 401 answered "No," 739 gave no answer.

To the question, "Do you favor any state assistance in providing more:

a. "Lying-in hospitals?", 630 answered "Yes," 384 answered "No," 445 gave no answer.

b. "Nursing service, before, during and after confinement?", 692 answered "Yes," 331 answered "No," 436 gave no answer.

c. "Expert obstetric consultants?", 544 answered "Yes," 450 answered "No," 465 gave no answer.

To the question, "Do you believe that, by any action on the part of the Department of Public Health in the distribution of maternity benefits, it would be possible to reduce

a. "Maternal mortality?', 661 answered "Yes," 371 answered "No," 427 gave no answer.

b. "Maternal morbidity ", 649 answered "Yes," 343 answered "No," 467 gave no answer.

c. "Infant mortality?", 698 answered "Yes," 320 answered "No," 441 gave no answer.

d. "Infant morbidity?", 693 answered "Yes," 305 answered "No," 461 gave no answer.

To the question, "Do you favor the granting of state aid to childbearing women

a. "By direct gratuity to mother?", 285 answered "Yes," 509 answered "No," 665 gave no answer.

b. "By payment of physician's fee?", 402 answered "Yes,' 414 answered "No," 665 gave no answer.

c. "By limitation of gratuities in accordance with the financial status of the family?", 530 answered "Yes," 344 answered "No," 585 gave no answer.

d. "By a general health measure, free to all inhabitants of the state?", 289 answered "Yes," 522 answered "No," 648 gave no answer.

The answers to the request for reasons for favoring or for opposing state aid to childbearing women in any of the proposed ways covered a wide range. No useful tabulation of them is possible. But the principal objections are based upon the fears:

1. that such legislation tends toward socialism and government paternalism;

2. that such aid would pauperize families accepting it;

3. that the state control of the practice of obstetrics would be the entering wedge of health insurance and subject the profession to politics and graft;

4. that the already over-burdened taxpayers would resent the large expenditure that would be involved;

5. that illegitimacy and also the procreation of the most unfit would result from such aid being given by the state.

Those in favor of state aid to childbearing women give as their reasons:

1. that every child, as a future citizen, has the right to proper care at birth, and that by such care

the state would be relieved of a considerable part of the expense of caring for cases of future helplessness that might have been prevented;

2. that conservation of health and the prevention of disease is a proper function of the state;

3. that larger provision of lying-in hospitals and of maternity nurses would save many lives;

4. that the standard of obstetric practice would be raised and that women would become better educated in the hygiene of childbearing if the State Department of Public Health should be authorized to undertake these problems;

5. that the number of abortions would be lessened and that midwives would be put out of business by a sufficient supply of prenatal clinics.

If the arguments of the physicians favoring some form of state aid being given to childbearing women are balanced against the arguments of those opposing, and if the "Yes" votes, as given above, are balanced against the "No" votes upon the proposed ways of giving such aid, it may fairly be stated that, while a majority are against giving maternity benefits directly, either to the mothers or to their physicians, a majority of practically two to one believe that, by state aid, in providing larger lying-in hospital accommodations and more maternity nursing service, it would be possible to reduce both the maternal and infant death rates and also their morbidity. A smaller majority favored the provision by the state of a larger, or of a better distributed, supply of obstetric consultants.

Many of the objectors state that no needs exist in their own special localities, giving as their reasons that they now have available sufficient lying-in hospital accommodations and also a sufficient supply of visiting nurses. Such answers, of course, only emphasize the reasons for action by the state to ensure similar advantages for all communities.

Regarding the other reasons given by the objectors, while we do not here undertake to present counter arguments, we may be allowed to state that in reaching our conclusions we have not failed to give most careful consideration to every objection that has been brought to our notice.

III. The Social Service Questionnaire.

To obtain the views of organizations engaged in visiting nursing and other forms of charitable work, a special appeal was made for their coöperation. Answers were received from The Worcester Society for District Nursing, The Associated Charities of Worcester, The Instructive District Nursing Association of Boston, The Brockton Visiting Nurse Association, The Lowell Guild of District Nursing and Baby Hygiene, The Lowell Social Service League, The Boston Provident Association, The Boston Children's Friend Society, The Newton District Nursing Association, The Visiting Nurse Association of Springfield, The Associated Charities of Boston, and The Children's Home Association of Hampshire County.

These answers were based upon 7,402 births during the year ending August 31, 1920, cared for by these societies.

In answer to the question, "Was there in any of these instances a failure of proper maternity care during confinement?"—five, representing 6,477 cases, said, "Yes"; six, representing 925 cases, said "No."

In answer to the question, "Was there any instance in which the mother was obliged through poverty to get up and be about sooner than the physician would ordinarily advise?"—four, representing 5,763 cases, said "Yes"; six, representing 1,639 cases, said "No."

In answer to the question, "Were there cases where definite impairment of health occurred, either of mother or of child, because of lack of proper care before, during, or immediately after confinement?"—three, representing 5,289 cases, said "Yes"; eight, representing 1,426 cases, said "No."

In answer to the question, "Was there any instance where failure of prenatal advice and instruction resulted in danger to the health of mother or child?',—two representing 5,041 cases, said "Yes"; nine representing 1,674 cases, said "No."

In answer to the question, "Would a straight maternity benefit paid by the Commonwealth, be justified, in your opinion, based upon your experience?"—three, representing 927 cases, said "Yes;" seven representing 772 cases, said "No."

It will, of course, be noticed that these answers are based upon the cases that were for more or less time under the care of these societies, and that, while they belonged largely to the destitute class, they nevertheless were far better cared for than were many in moderate circumstances. The comments furnished by these social workers are illuminating. Their experience certainly gives great weight to their opinions. All emphasize the importange of visiting maternity nursing. The Instructive District Nursing Association of Boston, for instance, reports a maternal mortalty rate of 28 per 10,000 births, where their nurses were employed, while for the whole city, the corresponding maternal death rate was 66.5, in 1918, and 66, in 1919. The infant death rate in Boston during the first week of life is reduced more than 50% where prenatal care is given.

Brockton reports instances where their visiting maternity nurses have been able to persuade pregnant women to give up shop work in proper season, and others their intended criminal interruption of pregnancy.

Lowell reports that existing facilities for hospital and nursing care are not sufficiently availed of by patients and their physicians.

Several societies report upon the special need for women illegitimately pregnant of prenatal and long-continued postnatal nursing care. In such cases a cash benefit, however large, would, perhaps, afford a temporary solution of the problem but not the necessary upbuilding.

The Associated Charities of Boston, which deals, for the most part, with families in straitened financal condition, reports only a very few cases where the mother failed to receive due medical and nursing care, or where the mother was forced by poverty to get up and about too soon after childbirth. Instead, the main trouble is from lack of household workers to care for the home and the other children during the mother's confinement. This lack, in their opinion, would not be overcome by cash maternity benefits, but only by supplying a trained corps of workers.

IV. Conclusions.

The results of its investigations of actual conditions of childbearing and of infancy throughout the state, in comparison with conditions elsewhere, and in some of our own favored localities, convinced the commission that it is high time for action.

The advice and suggestions given by experts and by those who answered the medical and social service questionnaires, served only to deepen this conviction that the state, acting for all, should undertake the safeguarding of mothers and their infants. The problem becomes more simple by stating it.

All proposals for maternity benefits purpose to make childbearing easier and safer for both mother and child. The different plans advocated may be divided into: first, the economic, and second, the hygienic. Hygienic measures may include economic relief, but no financial subsidizing of childbearing can insure hygienic reforms. We are thus led to search for the most feasible methods of safeguarding the life and health of childbearing women and their infants.

While undoubtedly there is large room for improvement in obstetric practice, we do not consider this subject to be within our range. It seems to belong, rather, to the medical schools and to the Board of Registration in Medicine, but within the past half

century a large share of medical responsibility in obstetric cases has been transferred by physicians to nurses who serve as their assistants. Maternity nursing has thus become of great importance. And it is in the further development of this that we find largest chances of improving the general hygienic conditions of childbearing. *Maternity Nursing* includes: (1) prenatal nursing, or the care of pregnant women; (2) obstetric nursing, or the nursing of women during their labor and confinement; and (3) postnatal nursing or the visiting care of mothers and their infants.

1. Prenatal Nursing.

The great advantages of the care of pregnant women by specially trained nurses is clear. The good results first shown by the Committee on Infant Social Service of the Women's Municipal League of Boston, begun in 1909 and, since 1915, carried on by the Instructive District Nursing Association, have since been confirmed in may other cities in this country. Besides the remarkable lowering of both maternal and infant mortality that results from prenatal nursing, there is an equally gratifying saving of the health of both the mothers and their infants, although this cannot be shown in statistics.

Wherever prenatal nursing is carried on, it is endorsed by the physicians as well as by the families served by it. But, where not understood, it is looked at somewhat askance. And, just as the anti-tuberculosis visiting nurses at the start often have to make their way against prejudice, so the prenatal nurses in beginning their work often have to surmount a like indifference, if not an active opposition.

Prenatal nursing has been carried on by private charities, and, latterly, by some Boards of Health. Despite advantages in the management of such service by volunteer organizations or by local Boards of Health, and the possible sacrifice of these advantages if the oversight were surrendered to the State Department of Public Health, such loss would be outweighed by the greater stability and uniformity and also by the wider scope of the service which would result.

The prevention of disease is the most important function of the medical profession. Fifty-one years ago the leading physicians of Massachusetts persuaded the Legislature of create the State Board of Health—the first in the country—to carry into effect what was then known, or might afterwards be discovered, of disease prevention. Prenatal nursing is a branch of preventive medical practice. The nurses so occupied are the physicians' assistants and lieutenants, carrying out the measures ordered.

If it is asked, "Why should not the families rather than the Commonwealth pay for whatever benefits they may receive from the visits of a prenatal nurse, and why should the state furnish such service in advance of any public demand for it?"—the answer is that the worth of such service is not yet generally recognized. Prenatal nursing, like all other health conservation measures, is essentially an educational service, and the wise policy of the state is to furnish free education.

2. Obstetric Nursing.

Every woman needs and ought to have the help of other women during her labor and confinement. In former days this help was given by neighbors. Today obstetric nursing is a specialty. Only the rich today can afford proper service. The very limited supply of obstetric nurses is made still less by the custom of keeping them for months afterwards as childmaids. This misuse of their professional skill and knowledge serves further to decrease the supply by deterring ambitious nurses from taking obstetric cases.

Essential as trained obstetric nursing is, such service is now to be had in only a small percentage of cases. In no other branch is the shortage so calamitous.

Immediate relief in large measure can be obtained by the service of visiting obstetric nurses during the labor and by daily visits during the confinement. This service, now given by some associations, ought to be available in every community. In our opinion, this is a proper field for action by the state through its Department of Public Health.

Most mothers will always prefer to have their babies born in their own homes and most families will be the better for sharing the incident troubles and joys. But lying-in hospitals are growing more and more popular, owing, in part, to the lack of nursing service.

Lying-in hospitals ought to be utilized mainly for abnormal cases and for the homeless. Unfortunately, the high rates charged by most prevent their use by many who need such accommodation. The lack of any medical supervision of many lying-in hospitals should be remedied by transferring from the Department of Public Welfare to the Department of Public Health the responsibility of licensing and supervising these hospitals. Provision should be made for patients needing hospital care who are unable to pay for it.

Other causes of the growing popularity of the hospital are the inadequacy of most homes and the need during the confinement of mothers' helpers. The loss of the old-time monthly nurses, who used to do all the household work as well as look out for both the mother and the baby, can be replaced by organizations which provide household workers and visiting nurses. Such provision can be furnished at prices well within the reach of families in moderate circumstances Such organizations are in operation and are, in large part, self-supporting. A comparatively small demand upon charity is made in order to ensure for the very poor the same adequate service.

Few families understand the benefit or the need of prenatal nursing, but all understand the need of help at the time of labor and confinement. In these cases, the family has time for saving the needed money and, where the service of nurses and mothers' helpers is available, it should be paid for by the families served.

The function of the community, or of the state, is to provide for all, rich and poor, a sufficient supply of such service. This might be done by the local Boards of Health and the various social service organizations, but, in our opinion, success would be more assured by charging the Department of Public Health with the general supervision of the scheme.

An adequate supply of skilled nurses and mothers' helpers, whose services could be had at moderate prices, we believe of greater benefit than the giving of financial aid to expectant mothers. To those unable to pay the regular rates, abatements could be made.

3. Postnatal Nursing.

The helpful supervision by a visiting nurse during the first year of infancy is as important as the prenatal and obstetric care.

Most of the sicknesses and deaths of infants are preventable and largely due to ignorance. Child Welfare Clinics, where mothers can learn how to feed and care for their infants, have caused a most marked saving of life and lessening of infant morbidity. In connection with the Welfare Clinics, the services of visiting nurses insure the carrying out of medical instructions.

Postnatal service can best be given by the prenatal nurses who have already won the confidence of the mothers. It is essentially an educational service and should be given without charge. As a branch of medical preventive practice, it ought to be available throughout the state and supervised by the Department of Public Health.

V. SUMMARY.

1. As a result of our investigations, we find that the mortality in Massachusetts, both of mothers and of infants, is much larger than it should be, or would be if proper care were taken of childbearing women, and, further, that the same is true of the amount of sickness and disability incident to maternity and infancy. We also find that these disasters are due primarily not to the poverty of the afflicted families nor to their social status, but, rather, to their ignorance of hygiene.

2. We are, therefore, forced to the conclusion that no sufficient relief would result from the distribution of maternity benefits in the form of cash, in whatever amounts or ways, as proposed in the various bills submitted to us for consideration.

3. We believe, instead, that childbearing can be better safeguarded and the burdens of it lightened by providing an adequate supply of maternity nursing service. This we believe to be a proper function of the state, that can be well performed through the Department of Public Health.

4. Prenatal, obstetric, and postnatal nursing visits are of educational and life saving value, as has been abundantly proved and we therefore believe that such service should be free to all.

5. As for the resident nursing needed during labor and confinement, and the equal need of houseworkers at such times, we believe that all who can afford to pay for it should do so. But we recognize the fact that, because of the present shortage, such service is often not now obtainable by families able and willing to pay for it. This shortage is due, in large part, to the lack of organizations that would make the existing supply of such service more available. And we believe that this default can be remedied by bringing its importance to public attention in all, as already it has been in some communities. We believe that state maternity nurses will be able to do this and thus to induce community movements for supplying this need.

6. Local agencies should be encouraged, wherever feasible, to furnish maternity nursing service. By this means local interest is fostered and a wider knowledge of local conditions is ensured, which is the first and most important step toward their betterment. To this end the State Department of Public Health should utilize, wherever possible, such agencies in its administration of maternity aid. One advantage of such procedure will be that families able and willing to pay in whole or in part for nursing services received will naturally continue to do so.

7. To pregnant women who have not sufficient means to pay for their subsistence and the medical care needed at the time of confinement, and to those women who, because of the unfitness of their homes or because of physical complications, need hospital care and yet are unable to pay for it, we believe that sufficient aid should be given. At the very least, their own and their infants' lives should be safeguarded.

8. This aid, we believe, should be given either, as it is now, by charitable organizations, or by the public authorities. We do not believe there should be organized any other agency for this purpose. But, in order to make sure that there shall be no failure in so aiding all whose need is real, we recommend that the Department of Public Health and the Department of Public Welfare be specially authorized to cooperate in furnishing such aid, without allowing the stigma of pauperization to fall upon its recipients.

9. We believe that all lying-in hospitals should be under the supervision of the Department of Public Health, and we therefore recommend that the responsibility of licensing them be transferred to that Department.

10. For these reasons, instead of endorsing any of the bills submitted for our consideration, we recommend the following legislation:

VI. AN ACT FOR THE BETTER PROTECTION OF THE LIFE AND HEALTH OF MOTHERS AND INFANTS.

SEC. 1. The Department of Public Health is hereby authorized to provide advice, instruction and visiting nursing care to women during pregnancy and confinement and to mothers and their infants after childbirth, regardless of their financial condition.

SEC. 2. Whenever it shall come to the attention of the Department of Public Health that any such woman is in need of aid other than that provided for in Section One, may certify the fact, together with recommendations as to the care necessary, to the Commissioner of Public Welfare or to the authorities of the city or town in which the mother or infant so certified is found in distress, and thereupon it shall be the duty of the Department of Public Welfare, or the local authorities, as the case may be, to provide such care; and no woman shall be deemed to be a pauper by reason of having received such aid.

SEC. 3. No mother or infant shall be eligible to the provisions of Section Two unless the mother shall at the time of certification have been a resident of this Commonwealth for a period of six months at least.

SEC. 4. The Department of Public Health shall make and may alter, revise or amend all reasonable rules and regulations necessary to the execution of this Act, and no mother shall be eligible to the provisions of this Act unless she shall comply with the same.

SEC. 5. The Department of Public Health in the execution of this Act may employ nurses on full time or on part time in its discretion and nurses employed on part time shall be exempted from the operation of Civil Service Rules and Regulations.

SEC. 6. The said department may take such steps as may be necessary to disseminate information regarding the objects of this Act.

SEC. 7 For the purpose of carrying out the provisions of this Act there may be expended annually by the Department of Public Health such sums as may be appropriated by the General Court.

It should be added that a separate bill is to be presented to the Legislature, providing for the supervision of Lying-in Hospitals by the Department of Public Health.

It is estimated that $300,000 will be needed to carry out the provisions of the act printed above.

Miscellany.

SOCIETY NOTICE.

THE NEW ENGLAND WOMEN'S MEDICAL SOCIETY will meet at the office of Dr. Denig, Hotel Bristol, Copley Square, Thursday, December 16, at 8 P.M. Subject: Aspects of Tuberculosis. Dr. Carvill, Infections of the Eye; Dr. Kleinert, Infections of the Throat; Dr. Cummins, Infections of the Skin; Dr. Adams, Surgical Aspects; Dr. Bigelow, Medical Aspects.

ALICE H. BIGELOW, M.D., *Secretary.*

RECENT DEATH.

DR. JOHN W. COUGHLIN died at his home in Fall River, on December 4. Dr. Coughlin was born in Fall River on June 9, 1861. He was a graduate of the College of Physicians and Surgeons in Baltimore, where he received his medical degree in 1885. Dr. Coughlin served four terms as mayor of Fall River. During the war he served in France on the Frothingham Mission. He is survived by one sister, Miss Helen Coughlin of Fall River.

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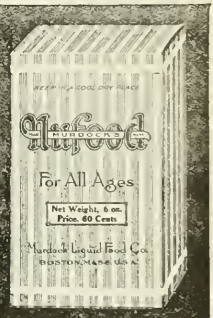

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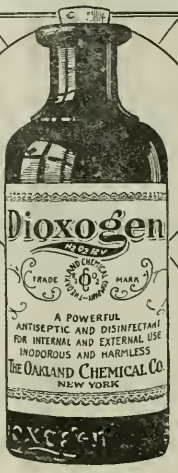

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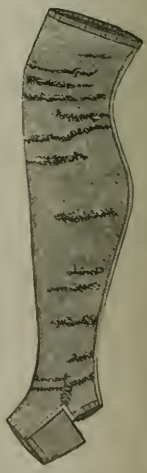

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